Prime Forcing Users to Buy New Software?

By Rita Shoor
CW Staff

Prime Computer, Inc. trying to force users to buy new software by withdrawing support on its older products?

That was the impression John L. Homer, manager of project services at Baker, McHenry & Welch, Inc. in Indianapolis, received at a recent Prime Users Group (PUG) meeting in Jacksonville, Fla.

In a letter to Robert Claussen, Prime's vice-president of domestic sales, Homer said he is "distressed by the revelation at PUG that [the] FTN [compiler], Cobol [compiler] and Midas are marked for abandonment by Prime.

"As a user who continues to suffer from Prime's 'immature' software, it seems inconceivable to me that Prime would abrogate [its] software maintenance contracts by declaring the existence of 'new products' as a means of extracting upgrade charges from users," Homer wrote Claussen. "Every indication seems to be that Prime is creating a situation where [it] will apply a hammerlock to existing users to buy additional 'improved' software or be abandoned."

"That is not our intention at all," Claussen responded.

Prime's policy is to provide support for the current version and "one revision back" of its software packages, he said. It has continued to enhance the Cobol compiler, for example, over the last three or four years and "there are still bugs we patch and fix."

The monthly update fee paid by Prime

(Continued on Page 6)

NEWSPAPER

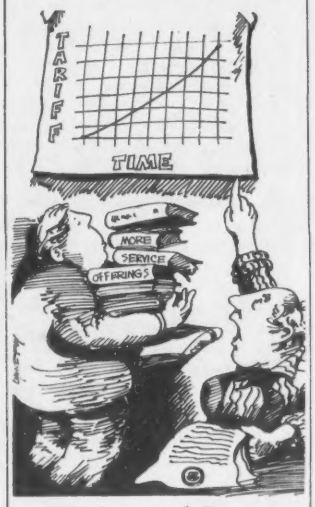
COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper Second-class postage paid at Framingham, Mass., and additional mailing offices

Vol. XV, No. 26 June 29, 1981 $1.25 a copy; $36/year

Life With the Phone Company



CW Special Report Follows In Depth/16

Covers Wider Distance

Wang Unwraps Rival for Ethernet

By Bruce Hoard
CW Staff

LOWELL, Mass. — Wang Laboratories, Inc. took the wraps off its first local-area network offering here last week when it announced Wangnet, a broadband system based on standard CATV components.

The introduction puts Wang in direct competition with several other local network vendors, including Xerox Corp., manufacturers of Ethernet. Wangnet's bandwidth is said to span the 10MHz to 350MHz range and employs "branching tree topology," which Wang claims is better than the Ethernet topology because it allows more nodes over a wider distance.

Because Ethernet is a baseband network, it does not require modems, one of the most costly features of its broadband competitor. However, Ethernet is generally considered to be limited to a 2,000-meter operating distance and 10M bit/sec transmission.

By comparison, Wangnet is good for up to 15 kilometers and features transmission speeds of 12M bit/sec on one of its three "bands," a spokesman said. The branching tree topology allows the network to split signals along multiple lines rather than being confined to the single backbone configuration found in Ethernet, he added.

Ethernet conventionally supports 1,024 workstations. None of them may be more than 100 ft from the main cable, according to the Wang spokesman. Wangnet, on the other hand, could theoretically support up to 65,000 nodes on just one of its three bands, he claimed.

The three bands are the Interconnect Band, the Wang Band and the Utility Band. Together, the three utilize only 35% of the network's potential bandwidth, leaving room for more applications in the future.

The Interconnect Band, like the other two, contains send and receive channels. It also features dedicated and switched capabilities with 9,600 bit/sec and 64K bit/sec transmission speeds, far slower than the Wang Band's 12M bit/sec capabilities.

(Continued on Page 8)

Air Traffic System Said Safe But in Need of Update Soon

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Now that concern about a possible air traffic controller strike has ended and it's again safe to make airline reservations (story on Page 4), attention here has returned to the equally burning issue of whether it is safe to use those airline reservations.

The yet-to-be-ratified contract agreement between the Federal Aviation Administration (FAA) and the Professional Air Traffic Controllers Organization was reached after several days of furious bargaining activity. While that was going on, a congressional subcommittee wrapped up three days of hearings on the air traffic control system itself — particularly the FAA's aging IBM 9020 computers.

The hearings were part of a continuing oversight process that has seen a full year of concentrated study of just how safe U.S. air travel is. Those involved in the string of investigations include the FAA, several House of Representatives and Senate subcommittees, individual members of Congress, the General Accounting Office (GAO), private consultants, unions, associations and interested observers. Their conclusion? That air travel is safer today than ever before.

However, no one credits the FAA's aging patchwork of computer, radar and communications for that conclusion. The FAA is fully aware of the

(Continued on Page 4)

DPers Lose Bid To Withdraw From Union

By Jeffry Beeler
CW West Coast Bureau

OMAHA, Neb. — Nearly 50 members of the Union Pacific Railroad Co.'s computing staff have failed in their bid to withdraw from a labor union they were forced to join last year.

The previously undisclosed setback occurred last month, when an independent federal agency rejected the employees' claim that their jobs differ substantially from routine clerical work and therefore they should be exempt from union membership.

The decision, handed down by the

(Continued on Page 9)

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This week Computerworld *begins "The History of Computing," a probing series that will attempt to answer that question by explaining the social, political and practical forces that shaped the lives of those visionaries of calculation and computing.*

Researched and written by CW writer/analyst Marguerite Zientara, the series begins on Page 14 with a look at Blaise Pascal and the historical developments that preceded his accomplishments.

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
TM reg. U.S. Pat. Off.

Second-class postage paid at Framingham, Mass., and additional mailing offices PN127420. *Computerworld* (ISSN-0010-4841) is published weekly, except: semiweekly the third week in March and a single combined issue the last week in December and the first week in January by CW Communications/Inc., Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

$1.25 a copy: U.S. — $36 a year; Canada, Central & So. America — $65 a year; Europe and Near East — $125 a year; other foreign — $175 a year (airmail service). Four weeks notice is required for change of address. Please allow six weeks for new subscription service to begin.

Computerworld can be purchased on 35 mm microform through University Microfilm Int., Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone: (313) 761-4700. *Computerworld* is indexed: write to Circulation Dept. for subscription information.

ABC ABP MCC MEDIA DATA FORM

POSTMASTER: Send Form 3579 (Change of Address) to Computerworld, Circulation Dept., Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

First Time in 97th Congress

House Gets DP Crime Bill — Again

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The computer crime bill that has languished in Congress for four years has been reintroduced in the House of Representatives.

The bill was put forward June 18 by Rep. Bill Nelson (D-Fla.), who backed the measure in the House during the last Congress. This is the first time the legislation has appeared in the 97th Congress. Its original sponsor, Sen. Abraham Ribicoff (D-Conn.), is now retired.

The purpose of the bill, in brief, is "to make a crime the use, for fraudulent or other illegal purposes, of any computer owned or operated by the United States, certain financial institutions and entities affecting interstate commerce."

The legislation, as sponsored by Ribicoff two years ago, was approved by a Senate Judiciary subcommittee in late 1979, but saw no other action in the last Congress.

In the House, no action was taken, reportedly because Judiciary Committee Chairman Peter Rodino Jr. (D-N.J.) was not in favor of the legislation. According to Nelson's administrative assistant, Jim Southerland, the situation is basically unchanged.

Crime Will Grow

But, he told *Computerworld* last week, "the [computer crime] problem is going to continue to grow and that works in favor of the legislation." Southerland added he does not see any great interest in the legislation in either the House or Senate at this time.

He explained Nelson's backing of the bill by noting the congressman's district includes Melbourne, Fla., home of Harris Corp. and other high-technology companies. Also, as a Florida state legislator, Nelson sponsored the first state computer crime bill, he said.

As of last week, the legislation had not been assigned to a particular subcommittee for consideration and there were no hearings scheduled. Southerland noted there is presently no way to know when, or if, it will see any action.

This is the third Congress to see the bill introduced. And although there have been revisions to the bill over the years, the provisions that stirred up controversy during the last go-round are unchanged.

The legislation is still open to criticism from those who see it as federal interference in traditionally state law enforcement responsibilities and from those who contend current laws are adequate for investigating and prosecuting computer crimes.

The proposed law does detail guidelines for invoking federal jurisdiction and calls for the Justice Department to closely monitor any state-federal conflicts in prosecuting computer crimes. But those provisions did not silence critics of the bill in the past.

Also, the bill still does not include a provision for a misdemeanor charge for unauthorized use of computers.

Some DPers have complained the bill would make it a felony to keep bowling league standings, produce Snoopy calendars and perform the other "harmless" but personal and unauthorized activities common to just about every DP shop, within and outside the government.

The bill sets as penalties for computer fraud and abuse fines up to twice any amount illegally gained or $50,000, whichever is higher, or five years in prison, or both. Intentional damage to a computer could draw a fine of up to $50,000 and a five-year prison term, or both.

Broad Definition

The legislation contains a broad definition of a computer: "A device that performs logical, arithmetic and storage functions by electronic manipulation, and includes any property and communications facility directly related to or operating in conjunction with such a device."

Drafters of the legislation explained two years ago the broad definition is necessary to cover future generations of machinery. The definition goes on, however, to specifically exclude electronic typewriters, hand-held calculators and home computers, which the sponsors felt are best left to state jurisdiction.

The legislation covers all computers used in interstate commerce or "owned by, under contract to, or operated for or on behalf of" the federal government and financial institutions.

Court Denies Memorex Bid For Review

WASHINGTON, D.C. — The U.S. Supreme Court last week declined to review Memorex Corp.'s unsuccessful $306 million antitrust suit against IBM.

Memorex brought the suit in 1973, contending that IBM illegally monopolized the IBM peripheral market. When a five-month trial in a San Francisco federal court ended in a deadlocked jury three years ago, the judge ordered a verdict in favor of IBM [CW, Aug. 28, 1978].

A federal appeals court upheld that decision last year, after which Memorex asked the Supreme Court for a review. As is customary, last Monday's decision by the high court was not accompanied by an explanation for denying the petition.

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Congress Winds Up Hearings on FAA System

(Continued from Page 1)

need to replace this system and plans to spend an estimated $2.8 billion to do so by 1990, by which time the agency expects the present configuration to be overloaded by increased air traffic. The agency has started a special program office to coordinate its systems upgrades, and while congressional critics are not satisfied with the pace of FAA activity, it is generally conceded the agency is heading in the right direction.

The problem is how to keep the present system running until the end of the decade. Availability of spare parts for the IBM 360-architecture computers is a worrisome problem; the machine language software needs constant patching and equipment outages continue to bedevil the controllers.

On top of all that, a recent Senate investigation report predicted that eight of the 20 traffic control centers will reach computer saturation between 1982 and 1985 — a development made fairly ominous by the three- to four-year FAA timetable for near-term computer systems improvements.

Popular Response

A possible response to this situation that proved popular during the three days of hearings by the Transportation and Aviation Subcommittee of the House Science and Technology Committee was a speedy hardware upgrade to extend the life of the current system until the overall replacement program can be completed. FAA officials said they are considering this option, but cautioned that current software "contains many special instructions that are either inoperable in, or mean something entirely different to, current generation processors.

"This factor," explained Neal Blake, FAA deputy associate administrator for engineering and development, "coupled with the need to develop new reconfiguration software, would make the software development effort substantial and time-consuming and, further, could contribute to computer outages."

His assessment was strongly countered, however, by several other witnesses, most notably from the General Accounting Office, which said, "the special instruction set of the current computer can be replicated on state-of-the-art computers, which would eliminate this purported barrier. Further, the improved design and reliability may preclude the need for special instructions."

Amdahl Corp. noted in its testimony that many vendors, including Amdahl, offer hardware compatible with the IBM 360 equipment. The additional instructions developed over the years for the FAA computers would be simply recompiled for upgraded hardware, the company said.

"Since the instruction set is so compatible, this running and proven software can be used as a bridge to the system of tomorrow with a minimum of conversion," according to the firm's testimony.

"Transferring [air traffic control] (ATC) software to new hardware can be implemented with minimal disruption in the present ATC centers, no construction or remodeling will be required, and personnel retraining is limited," Amdahl said.

"In addition," the firm said, "the overall goal is very simple: To make the software from the current ATC complex run on state-of-the-art hardware. With an assumed good working relation with the FAA, the accomplishment of this objective can be performed in a period we estimate to be within two years."

Because Amdahl would be considered a likely candidate as a vendor of this upgrade, its recommendation can hardly be considered that of an impartial observer, but its suggestion is likely to find a sympathetic ear in Congress, which is pressing the FAA for detailed upgrade plans by this fall.

FAA Stance

While FAA Administrator J. Lynn Helms has rejected development of a full interim ATC system, he did tell the subcommittee the current IBM mainframes will most likely have to be replaced [CW, June 22.].

Under continuing pressure to assure Congress the current system will ensure traveler safety until the proposed long-range replacement, the FAA told the subcommittee it will consider the short-term alternative of acquiring new computers and rehosting the ATC software. The agency cautioned, however, that this is just one of several options under review and declared itself not ready to decide at this time on the best alternative.

As newly appointed administrator, Helms said he has not had time to respond to congressional recommendations on system upgrades.

Air Traffic Controllers Strike Narrowly Averted

By Marguerite Zientara
CW Staff

WASHINGTON, D.C. — A strike by air traffic controllers that threatened to paralyze the nation's airports was averted only three hours before it was scheduled to start last week.

The strike was called off after a 13-hour negotiating session between representatives of the Federal Aviation Administration (FAA) and the Professional Air Traffic Controllers Organization (Patco). While the pact finally agreed upon by Department of Transportation Secretary Drew Lewis and Patco President Robert Poli would give controllers the $40 million first offered by the government — far below Patco's requested $770 million wage and benefits package [CW, June 12] — the union did win concessions in nonfinancial areas.

The agreement, reached between 3:30 and 4 a.m. last Monday, would give Patco the right to participate in the formulation of procedures to handle air traffic safely and efficiently and to make recommendations on new equipment. However, the union would have no veto powers.

At a time when the question of new air traffic control equipment — particularly computer equipment — is a source of major disagreement between Patco and the FAA, the clause is an important one.

Indicating that Patco plans to make recommendations in the area of new computer equipment, a Patco spokesman noted last week, "It's an area we've followed very closely for a long time." When asked whether he felt Patco's input would have any real influence on FAA management, the spokesman replied, "We certainly intend it to have."

Financial Arrangement

Regarding the financial arrangements, Lewis indicated the tentative package represents a 6.6% average annual pay increase for controllers in addition to the estimated 4.8% pay increase that all federal workers are slated to receive this October. That means that controllers, who sought an immediate $10,000 raise, will get an average annual increase of $4,000, according to Lewis. Patco was unable to confirm those figures.

It appears that neither side "won" in the negotiations: Lewis called the agreement "fair and equitable" and Poli said he was "pleased" with the settlement.

Still subject to ratification by the full membership of Patco — a process that could take a full month — the contract would cover a 42-month term ending Jan. 15, 1985.

CUE Sets Conference

SEATTLE — The Comten Users' Exchange (CUE) will hold its 17th international conference here Sept. 21-25.

Topics to be addressed will encompass NCR Comten on communications network architecture, migration/emulation to IBM's Systems Network Architecture, local networks using Comten and the managerial and technical considerations of network planning and change.

More details about the conference are available from Marilyn Cianciolo, CUE President, GM Technical Center, Warren, Mich. 48090.

Claims to Be First

Remote Computing Vendor Offers SNA/SDLC

By Bob Johnson
CW New York Bureau

NEW YORK — Full implementation of IBM's Systems Network Architecture (SNA), several software packages and hardware designed for more reliable data transmission were introduced here recently by Boeing Computer Services (BCS).

BCS claimed it was the first remote computing company to provide SNA dial-up Synchronous Data-Link Control (SDLC) network capabilities. The company added that it supports bisynchronous and asynchronous telecommunications protocols as well.

BCS said the network will support all 3270-type and other SNA-compatible terminals, and through the use of two advanced communications function components, Virtual Telecommunications Access Method (ACF/Vtam) and Network Control Program (ACF/NCP), the SNA facility will significantly enhance the existing BCS data communications network. In addition, BCS said SNA will provide the base for supporting IBM 8100 and 4300 processors.

SNA Service Charges

The charges for the BCS SNA service are calculated on a time and resource basis, BCS said. The dial-up charge is $16 per connect hour, per SDLC link; dedicated line charges are $950/mo for 4,800 bit/sec transmission and $1,350/mo for 9,600 bit/sec.

BCS said the network capabilities permit it to offer a series of new software packages on its current Mainstream-TSO service. The software includes the Integrated Database Management System (IDMS); the Panvalet direct-access library system; System Productivity Facility (SPF), a subsystem of Mainstream-TSO; Data Language/1 (DL/1) data base management system; Customer Information Control System (CICS); Screen Definition Facility (SDF); and Development Management System (DMS), an application development tool.

BCS also announced the availability of System Language 1 (SL/1), an applications system design tool developed by Thorne Data, Inc. for which BCS has obtained the marketing rights. The company said SL/1 automates most manual programming tools, generation of code and testing and program documentation. BCS will offer SL/1 under a licensing agreement that includes training, support and maintenance for the first year.

For the scientific and engineering communities, BCS introduced its Mainstream EKS/VSP service based on the Cray-1 computer's vector processing. This service was designed for solving large-scale computational problems, BCS said.

Claims Another First

BCS claimed another first for the information services industry with the announcement of its Terminal Service Unit (TSU). TSU is microprocessor-based proprietary hardware that reportedly improves data transmission reliability by eliminating reruns of data caused by faulty transmission. It is also the first device to provide error control, data quality monitoring and terminal usage statistics, BCS added.

TSU is offered as a complement to BCS' Mainstream time-sharing service for users of low-speed data terminals on local dial-up lines, BCS said. The purchase price for the TSU is $950, or $1,750 with a modem, the company noted.

Further information can be obtained from Boeing Computer Services Co., 7980 Gallows Court, Vienna, Va. 22180.

MTS Rate Hike May Be Reduced

WASHINGTON, D.C. — A 16% increase in AT&T's rates for long-distance Message Toll Service (MTS) scheduled to become effective July 9 may end up being 13% instead.

The Federal Communications Commission Common Carrier Bureau has tentatively decided that a 13% increase would "raise no questions of lawfulness and thus appears to be reasonable." A 16% increase, the bureau added, may increase the rate of return beyond the 12.75% ceiling authorized by the commission.

The phone company is free to submit new evidence to support the 16% MTS rate hike, but this data probably cannot be analyzed before July 9, the bureau said, and a suspension of the tariff, which could delay imposition of higher rates by as much as five months, might be necessary.

If AT&T accepts a 13% increase in MTS rates, the new tariff could become effective this week. Two other increases — adding 10.5% to Wide-Area Telecommunications System (Wats) rates and 16% to private-line charges — are presently scheduled to become effective July 9, but AT&T has requested special permission to make them effective earlier. Commission action on this latter request was imminent at press time.

Postal Service Posts, Asks Input on Ecom Specs

By Phil Hirsch
CW Washington Bureau

WASHINGTON — The U.S. Postal Service has proposed interface specifications for Electronic Computer-Originated Mail (Ecom), the electronic mail service for mass mailers scheduled to begin next January. Postal officials invited comments on the specs by July 23, after which a final version will be developed.

According to the specifications, "serving post offices" (SPO) in 25 cities will be interconnected initially. Access to the Ecom network will be available only through common carriers or "message processors" — firms that reformat the sender's messages to satisfy postal regulations and/or consolidate small message streams from multiple senders.

The Postal Service plans to offer public and private connections at each SPO. The former will interconnect with dial-up telephone links and support IBM's 2780/3780 bisynchronous protocol as well as asynchronous Teletype Corp. (KSR/ASR Model 33/35-compatible) protocol.

Terminals employing bisynchronous protocol will communicate with the Ecom net on a half-duplex basis — at 2,400 bit/sec for those with Bell 201C modems and at 4,800 bit/sec for those with Bell 206B modems. Asynchronous transmission will be at either 300- or 1,200 bit/sec and require Bell 212-A or compatible modems at the terminal end.

X.25 Protocol

An X.25 packet protocol will be offered to public access users "when warranted by demand and commercially available equipment," the post office said. It also plans to support Digital Equipment Corp.'s DDCMP.

The Postal Service hopes to provide enough public access ports at each SPO to "assure that during the busiest hour of a typical business day, no more than 5% of the incoming calls will find all ports of that type [synchronous or asynchronous] busy. The Postal Service may not, however, be able to meet this standard when service commences."

Public ports will be offered to both carriers and processing companies; private ports, however, are to be leased only to the carriers. Lease charges for each have not yet been announced; a Postal Service spokesman said the rates are "under intensive development."

Private ports, besides guaranteeing immediate access, can be customized to provide greater throughput by adding, for example, special speed, code and protocol conversion circuitry. Furthermore, the carrier that leases a private port can resell a portion of its capacity to others.

However, several restrictions on these private ports were included in the proposal. Notable among them is the requirement that a lessor guarantee a minimum volume of message traffic and the stipulation that if all requests for public and private access can not be honored, the former will be filled first.

Format Description

The proposal contains a detailed description of the format the Postal Service wants to use for Ecom messages. Essentially, each transmission will consist of a series of blocks, beginning with an "Ecom group label," followed by one or more message blocks (each containing the text of a message plus header, control and address information) and ending with a four-byte "end of message" block.

The log-on procedure would require the sender to "initiate a transmission session by entering a predetermined character sequence. Ecom will then prompt for a log-on sequence which, when entered and successfully verified," will enable the sender to begin transmitting messages. A somewhat similar procedure is required to end each transmission session.

"Prior to initial entry into the Ecom system," the proposal continued, "customer interface equipment and procedures must be certified by successfully passing valid telecommunications traffic to the USPS Test and Development Facility" in Rockville, Md., a Washington, D.C. suburb.

Prime Cutting Back Software Support?

(Continued from Page 1)

software customers covers "normal enhancements," Claussen explained, but "the new Cobol [compiler] is not just a bug-free rewrite of the current compiler ... it will contain many new enhancements."

While no formal announcement about withdrawing support for any of the products was made during the conference, Homer said the first indication that this might be happening came during a question-and-answer session with Paula Frode, product manager for Midas.

Midas is a multiple-index file-handling system that Prime customers currently get as a bundled item when they buy Prime's operating system software, Homer said. There is no separate charge for the package.

When questioned about possible Midas upgrades, Frode said that what Prime had in a preliminary test phase was actually a "replacement for Midas." She implied that Prime would charge for the new product, according to Homer.

The prospect of a chargeable replacement product for Midas was not particularly significant by itself, the Prime user noted, but he feared that it was a portent of coming events when similar revelations were made about FTN and Cobol.

Like Midas, Prime's FTN, a Fortran compiler, is a bundled item. The vendor's more recent product, a Fortran-77 compiler, is charged separately. At the PUG meeting, FTN users were informed that at some undefined future time they would have to convert to Fortran-77 and pay for it separately because Prime would no longer support FTN.

The situation with the third product, Prime's Cobol compiler, is different because customers already pay separately for this software. Homer described it as a "flawed product" with features that do not work as described in the accompanying documentation.

During a PUG management seminar, a user asked, "When will Cobol work?" Winfried Burke, manager of market planning, indicated that Prime is testing a new Cobol compiler that would also be a chargeable item.

Most attendees came away from that seminar with the idea that there will not be an upgrade charge for current Prime Cobol customers, according to Homer. However, he was later told informally that "any customer who wants to take advantage of the new features of the product would have to pay some charge."

This would mark a change in vendor policy since it would be the first time Prime released a chargeable replacement for a software product that was already a chargeable item, Claussen acknowledged. The not-yet-released Cobol compiler is "a complete new product with major enhancements," and Prime believes that what it is doing is "consistent with industry policies on major product enhancements."

Prime "wouldn't leave customers out in the cold," Claussen responded to Homer's charge of "abandonment."

"We are not forcing a customer to change from one product to the other," he stressed, "but it is a fact that we will not want to maintain an indefinite number of versions of a new product indefinitely."

Who decides what differentiates a "basic" software enhancement from one that is a "major" change — vendor or customer? Homer's letter may indicate that Prime and its software customers will be arguing that point in the not-too-distant future.

Revised Text Out On Computers, Law

CHICAGO — The third edition of *Computers & The Law — An Introductory Handbook* has been released by the American Bar Association's Section of Science and Technology.

In the 366-pages, more than 50 contributors provide a general introduction to the subject of computers and the law. The handbook covers evaluating computerized legal research, personnel licensing and liability, software contracts and privacy.

The text costs $22.50 and can be obtained from the Commerce Clearing House at 4025 W. Peterson Ave., Chicago, Ill. 60646.

Europeans Seen Receptive To Automation

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — European countries have backed off from the near-Luddite fervor that marked earlier talks on the societal effects of automation, reported U.S. delegates who attended a recent international workshop on the vulnerability of computerized societies.

"The Europeans have really caught religion on computer vulnerability," Richard Howarth of the State Department told a meeting of the department's transborder data flow working group recently.

Howarth speculated there have been enough incidents of computer center sabotage overseas to make European officials realize "maybe the machinery's more vulnerable than the society."

Howarth and several of the U.S. delegates to the May 19-21 meeting in Siguenza, Spain, sponsored by the Organization for Economic Cooperation and Development (OECD), said it focused on computer security and on systems design and management.

U.S. officials and representatives of American multinational corporations had feared the meeting would prominently feature some of the xenophobic rhetoric that has arisen as some countries, Sweden and Canada especially, have studied possible national security problems attributed to increasing automation.

Typical Vulnerability Topic

A typical vulnerability topic has been possible loss of valuable information resources during a national emergency if large amounts of a nation's data processing are done by multinational firms located beyond the country's borders, such as by U.S. firms operating over international telecommunications links.

However, the State Department reported that "while the inevitable themes of sovereignty, dependence and cultural erosion cropped up [during the workshop], discussion was nonpolemical and reflected a genuine desire to arrive at potentially fruitful lines of inquiry."

Expanding on that, Howarth said, "an awful lot of the sheer junk that has come up in OECD meetings," such as the supposed dehumanization of computerization, "when it hit the light it just turned to dust."

Former Commerce Department official Arthur Bushkin, another U.S. delegate to the conference, agreed with Howarth, saying the meeting "was a fairly rational discussion in toto."

Delegate Harry DeMaio, IBM director of data security programs, said the workshop reflected "a very, very positive attitude" on the part of the attending countries.

The emphasis was on making systems better and there was far less "hand wringing" about possible adverse affects of computerization, he said.

Europeans are now more interested in improving systems than in shutting them down because of vulnerability concerns, DeMaio said.

Third World Information Program Planned

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The Rome-based Intergovernmental Bureau of Informatics (IBI) recently announced plans for a $1 billion "programme for the information of the Third World."

The program was a topic of discussion at an IBI meeting in Mexico City last week, called to lay the groundwork for the second World Conference on Informatics Strategies and Policies (Spin) set for Havana, Cuba, in June 1983.

In announcing last week's meeting, IBI said the program is needed because "the informatization of underdeveloped countries through creating managerial and administrative infrastructures is a necessary condition ... for their development."

The statement defined informatics in terms of Third World needs as "a discipline in which technological tools such as the computer are, in current economic terms, within reach of all countries."

The basic problem, IBI said, is that developed countries' ability to manage information technology is catapulting them further and further ahead of developing nations in the use of information.

"This means," IBI said, "that without an immediate worldwide action to informatize underdeveloped countries, world imbalance will be even more accentuated with all the dangers of chaos that this represents."

IBI said a major goal of the Spin conference will be to devise means for developing countries to "manage by themselves and to channel their efforts and political will in the direction freely chosen by them" to fully participate in the benefits of informatics.

The billion-dollar program will address the problems of developing the necessary managerial infrastructures to achieve that goal, according to IBI.

U.S. officials here said $400 million of the program has been pledged by a yet to be identified oil producing country in either the Middle East or North Africa.

Wang Unwraps Rival To Xerox's Ethernet

(Continued from Page 1)

The dedicated portion "looks like a standard telephone circuit, but within the building," the spokesman noted. Multiple vendor computers may be attached to the band through the standard RS-232 and RS-449 interfaces.

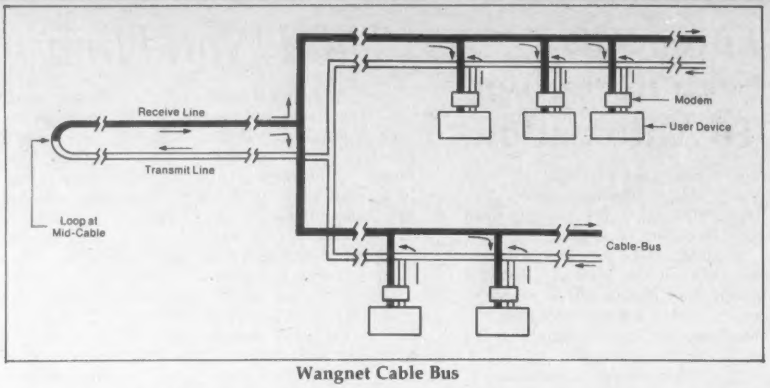
It supports asynchronous communications as well as IBM's Binary Synchronous Communications and Synchronous Data Link Communications protocols.

Thirty-two lines running up to 9,600 bit/sec simultaneously through fixed-frequency modems and the RS-232 interface are available. Sixteen simultaneous 64K bit/sec channels run fixed-frequency modems through the RS-449 interface.

The switched portion of the Interconnect Band is best used for transactions in which computer equipment must be able to communicate with multiple sites in the same building. It features a dataswitch that initiates dialing and tells frequency agile modems which frequencies the nodes are operating at.

All told, the switched portion facilitates simultaneous connection of up to 512 devices over 256 9,600 bit/sec lines, the vendor said.

The dataswitch also accommodates off-system communications over outside telephone lines, the spokesman added.



Wangnet Cable Bus

Both the switched and dedicated methods, although far slower than Ethernet's 10M bit/sec speed, avoid the snags inherent in Ethernet's Carrier Sense Multiple Access/Collision Detection (CSMA/CD) method, the spokesman said.

Line Access Method

CSMA/CD is a line access method based on contention between nodes, which may try to access the network simultaneously. In that case, the transaction is voided and both nodes must try again.

The 12M bit/sec Wang Band was designed exclusively for the vendor's OIS, VS and 2200 computer systems and features an "improved" CSMA/CD methodology, he claimed. The band employs the High Level Data Link Control packet format and packets may be up to 2K bytes in length.

A Z80 microprocessor-controlled cable interface unit (CIU) ties the three systems to the band, which is a better medium for CSMA/CD because of its "bursty," on-and-off traffic flow, he observed.

Here are the band's capabilities:

- A user of any of the three systems may send documents or computer files to the others and vice versa.
- It may be used for Wang's Mailway electronic mail system and any workstation may, in effect, obtain the processing capabilities of another.

X.25 Capability

Of the OIS, VS and 2200 systems, only the 2200 has announced an X.25 capability for routing users onto the public packet-switched networks, such as Tymnet and Telenet. However, the spokesman noted, "In our network, you only need one. You don't need all three because you can copy information."

The third, or Utility Band, is comprised of seven independent channels dedicated to both freeze-frame and full-motion video.

It is designed for videoconferencing and closed circuit television and operates in the 174MHz to 216MHz range commonly used by CATV stations. All video equipment must be obtained from outside vendors, he said.

Pricewise, the Wang spokesman claimed Wangnet is $720 cheaper per user than Ethernet in a "typical" application.

The typical application he cited was a Wang VS system in which 10 workstations were divided into the $3,800 cost of the CIU, giving an average end-user cost of $380.

"The cost of an Ethernet attachment is about $1,100 and that's right off their price list," he claimed. As mentioned previously, however, the no-modems Ethernet eliminates the $850 and $1,200 Wangnet users must pay for modems on the Interconnect Band.

Utility Band

The Utility band is available immediately and is subject to cable and installation costs. Hardware for the dedicated portion of the Interconnect Band is scheduled for availability between January and February of next year. A Wang 9,600 bit/sec fixed frequency modem for it costs $850 and the 64K bit/sec fixed frequency model, $1,200, according to the vendor.

As far as hardware for the switched part of the Interconnect band is concerned, the firm said, a data switch costs $12,000 and the frequency agile modems, $1,250 each. They are scheduled for June of next year. The Wang Band will be available in October 1982. A CIU for it will sell for $3,800, the vendor said.

Wang is located at One Industrial Ave., Lowell, Mass. 01851.

Union Pacific DPers Lose Bid to Leave Union

(Continued from Page 1)

Washington, D.C.-based National Mediation Board (NMB), has solidified the employees' tie to the Brotherhood of Railway and Airline Clerks (Brac), an international labor organization that unionized them without their prior knowledge or consent in April 1980.

News of the forced unionization triggered strong opposition among many of Union Pacific's computing staffers, who more than a year ago asked the NMB to review the case and effectively nullify Brac's takeover. The NMB complied with the request for a hearing, but ultimately ruled in Brac's favor and in so doing apparently dashed the employees' last hope of freeing themselves from unwanted union control.

The NMB decision had little if any impact on Union Pacific's programmers, who were already long-time Brac members and who never became directly involved in the recent dispute. But the ruling profoundly affected 48 of the railway's systems analysts, project leaders, data base specialists and other computing personnel, most of whom greeted the development with a mixture of sadness and resignation.

"We're not happy about losing the case, but we've accepted the defeat out of necessity," according to Dave Cavanaugh, one of Union Pacific's 35 systems analysts. "We've exhausted all the legal avenues open to us, and there is no appeal. So that's the end of the matter."

Cavanaugh took exception to the NMB's conclusion that systems jobs are fundamentally indistinguishable from clerical work. "I think the board misunderstood our arguments in the case because its position seems to be that, since computers just perform operations like addition and subtraction, computing people are only involved in clerical, repetitive work," he said. "But our position is that systems analysts don't do clerical work itself; they do systems design, which has traditionally been considered a management or professional function."

Legal Authority

Brac's legal authority to expand its Union Pacific representation comes from a 1920 agreement between the labor organization and the U.S. Railroad Administration. In essence, the agreement limits the scope of Brac's collective bargaining power to designated job categories, one of which is the "clerical class or craft."

For years, the only Union Pacific computing employees who were included in the clerical class or craft were relatively low-level staff members like programmers and operations personnel. However, in 1974, Brac began negotiating with Union Pacific to redefine the clerical class or craft to include middle-level computing personnel like systems analysts, who had historically been considered part of management and had therefore remained exempt from union control.

For about six years, Union Pacific resisted Brac's efforts to expand the scope of its authority. However, on April 17, 1980, management finally agreed to reclassify its middle-level computing employees as clerical personnel and thus paved the way for their eventual unionization.

Ironically, the two sides reached an accord without ever allowing the employees to vote on the unionization question or even informing them that a change in their classification was being considered [CW, Aug. 25].

When news of the secret Brac-Union Pacific agreement finally became public, the shocked employees responded by forming their own organization known as the Association of Data Processors-Analysts (Adpa). They also enlisted the aid of the Springfield, Va.-based National Right to Work Legal Defense Foundation, a nonprofit group whose mission is to help workers combat forced unionization.

On May 28, 1980, Adpa filed a petition urging the NMB to recognize the computing field as a separate class or craft for collective bargaining purposes. The petition, which also urged the NMB to hold an accretion election in the event of an unfavorable ruling, cited the typical computing employee's advanced education, specialized training and highly technical job duties as evidence that the information-systems field lacks a community of interest with clerical workers or any other Union Pacific personnel.

If the NMB had approved the application, the door would have been left wide open for the petitioners to leave Brac and either form an independent union or revert to their original nonunionized status.

However, the NMB rejected the employees' application and its supporting arguments last May 14 on the grounds that, although computing personnel use more technologically advanced equipment than clerical workers, the two classes of employees perform basically the same function. The board also refused a request for an accretion election.

Union Pacific's management reportedly shares the NMB's and Brac's view that the railway's computing employees fall in the same category as clerical personnel and thus lie within the labor organization's scope of authority.

National Driver Register Targeted for Extinction By Reagan Budget Cutters

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The National Driver Register (NDR), a controversy-plagued program to notify states of problem drivers' records, has been marked for extinction by Reagan administration budget cutters.

The Department of Transportation's (DOT) National Highway Traffic Safety Administration, which administers the program, has been lobbying for a multimillion-dollar upgrade to the system that would include a national telecommunications/DP network. The proposal has been stalled by opponents' arguments that it raises serious and unanswered federalism, privacy and security questions [CW, Jan. 12, Feb. 12].

Now, despite backing for the system and the upgrade in the Senate and House of Representatives, DOT Secretary Drew Lewis is proposing that the entire NDR program be scrapped.

But Rep. David Oberstar (D-Wis.), the NDR's leading congressional advocate, has not given up the fight. "We're still going to forge ahead with it," Oberstar aide Ed Eliot told *Computerworld* last week.

Noting that it will be a while before Congress decides whether to go along with DOT's budget proposal and drop the NDR, Eliot said Oberstar will take a "wait and see" approach. "Just because the administration is opposed to this does not mean we're going to abandon it," he said.

Worthy Aim

Not even the NDR opponents argue that the program's aim — to keep the estimated 14 million problem drivers off the road — is not a worthy undertaking. But the 20-year-old program has not proved successful because it takes too long to check the records of driver license applicants.

An upgrade to include computer terminals at license granting offices in every state with on-line communications capability to driver record data banks across the country would cost the federal government as much as $71 million over the first 10 years. This is an expense the administration is evidently not willing to approve.

In a letter to Congress two weeks ago recommending that the NDR be abolished, DOT's Lewis also raised a favorite administration theme, suggesting the states could better carry out the program themselves. "If the states decide the register functions make important contributions to their driver licensing programs, they could establish and administer a system similar to the register for their own use," he suggested. "Federal involvement in such a system would not be necessary."

Lewis cited in his letter a recent DOT study that said the system would never be successful unless there is full state cooperation and suggested there is little chance for nationwide participation. He said the strict privacy laws of some states limit their participation and noted that failure of some states to keep accurate records has further driven down the register's effectiveness.

In the study, Lewis said, "the department tentatively concluded that the register should be abolished if it could not be significantly improved. After examining the prospects for improving the system, the department now concludes that improvements at the federal level will not affect the problems of privacy laws and inaccurate data that keep many states from participating in the system and that it should . . . be abolished."

Packages Urged as Cure for Productivity Ills

By Marcia Blumenthal
CW Staff

BOSTON — Don't expect a productivity improvement of 500% — which is roughly what is needed in most DP shops today — if you are trying to compensate for inadequate software with structured methodology, high-level languages or new programmers.

Those methods may ease the problem, but they yield productivity improvements of only about 20%, Dr. George Schussel said here last week.

Instead, it is the increased use of software packages that can lift productivity to an appropriate level in coming years, the vice-president of the American Mutual Insurance Group suggested at the first National Packaged Software Conference.

Software packages will gain much wider acceptance during this decade because they are so much better than they used to be and because of the dramatically decreased cost of hardware, Schussel told nearly 200 management information systems and other managers at the three-day meeting sponsored by AMR International, Inc.

The highly competitive environment of the software industry ensures the availability of state-of-the-art technology as vendors vie to create aggressive enhancements for their products, he explained.

Moreover, because the declining cost of hardware may make hardware a secondary consideration for users during the decade, he recommended that users define the functional needs for the software's optimum performance, "buy the software first and then see what kind of hardware it needs."

Schussel, who is also a consultant for AMR International, sees much less standardization of software during the decade: "Ten years ago Cobol was a standard, but people are using every language under the sun."

(Continued on Page 12)

First of Three

BOSTON — The National Packaged Software Conference held here last week was the first of three slated for the coming year. AMR International, Inc. will hold another conference Oct. 26-28 in San Francisco; a third meeting is anticipated in Toronto.

Users pay $395 to attend the conference, which consists of a series of hour-long technical presentations of both applications and system software. At the two coming events, plans call for adding 16 more vendors to the 34 allotted presentation times at the conference here.

AMR International is located at 1370 Ave. of the Americas, New York, N.Y. 10010.

First Packages For Many

BOSTON — For many attendees at the first National Packaged Software Conference here last week, it was the first time they had gone outside their DP departments for software packages, according to an informal poll by *Computerworld*.

"We've always built systems, but we are finding out we are not so unique, and packages are getting better," said James Poulin, vice-president of the Information Systems Division of Federal Home Loan Bank. He was looking for a general ledger system.

Looking for the same thing was Intermetrics, Inc., a Cambridge, Mass., company that builds software compilers. The firm is trying to replace a seven-year-old jerry-built system and is using a task force approach, along with some consulting from Arthur Andersen & Co., to evaluate available packages.

"We need a system that will allow the company to grow from a $22 million to $150 million firm," Brad Parkinson, group executive officer at Intermetrics, said.

Although many users were in the market to purchase various types of application packages, most viewed the conference as an opportunity to gain a lot of information without expending a lot of effort — a kind of software supermarket.

None of the users interviewed said they would make a decision based upon vendor presentations at the conference, but many said they were under a certain amount of pressure to make a commitment in the near future.

From the users' perspective, one advantage of a conference that offers 34 software vendors in a single location was the opportunity to weed out packages not suited to their needs. After listening to a presentation by McCormack and Dodge Corp., Keith Slater, DP manager of Fisons, a pharmaceutical firm, said the vendor's software, although interesting, did not suit his firm's needs. Fisons is looking for a general ledger system to run on a Data General Corp. Eclipse C150.

House Hears Telecommunications Users' Side

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — Users had their day — actually two days — in Congress last week when the House of Representatives Communications Subcommittee held hearings on "user needs and concerns in the new marketplace of communications."

There have been innumerable hearings on telecommunications during the past five years, Subcommittee Chairman Tim Wirth (D-Colo.) pointed out, but "little evidence has been presented which would indicate where competition exists or may develop in the near term."

He did not mention S. 898, the Communications Act rewrite bill recently introduced in the Senate, but Wirth almost certainly had this legislation in mind; it is based on the premise that competition will soon be widespread in the telecommunications industry.

Witnesses who appeared at the first day of the House subcommittee hearing made it clear they do not believe competition is likely to be great enough for some time to allow the sort of deregulation specified in S. 898.

Possibly the best statement of this position came from Richard J. Vande Merkt, corporate telecommunications manager for Montgomery Ward & Co., who appeared on behalf of the National Retail Merchants Association.

Restricted Choice

It is a mistake to assume that competition has been increased because suppliers of long-distance telecommunications services are now more numerous, he pointed out, adding that price, performance and other limitations sharply restrict the user's choice.

"We have yet to see the type of price competition that constitutes . . . true competition," Vande Merkt explained. "AT&T's market power is so dominant that . . . increases in Bell's intercity service rates are usually matched by . . . competitors."

Although Ward's has been using specialized carriers for several years, the benefits are difficult to identify, he indicated. "Today, the largest difference we see between Bell and the other carriers is that it takes months longer for them to supply service.

"They are not capable of providing tie lines on a continuous basis because of a lack of facilities. Much of their new capacity has been used in other markets that are apparently more profitable, such as the residential long-distance market."

Degradation of service quality is another problem, Vande Merkt said. His company began using MCI Communications Corp. network service in 1979 "when it was equal to AT&T service in quality, but considerably cheaper."

Since then, MCI service "has slowly deterioriated because of overloads on the carrier's microwave system," he said, and added that today, Ward's is "faced with the alternative of going back to total AT&T service," which will be more expensive, or in accepting "degradation of circuit performance."

Deregulation is not the answer to these problems, Vande Merkt insisted. Rather, what's needed is a "deregulatory scheme that is lifted only when hard facts are available to prove that competition exists in a specific area.

"Until this is possible, the rules should allow users maximum freedom to develop their own communications systems using private and common carrier facilities. Full-scale deregulation of business services is not appropriate today, nor is it likely to be in the near future."

Packages Touted

(Continued from Page 11)

Software will be less transportable as a result, but hardware costs are so low that users will never have to convert applications, he maintained.

Problems with packaged software can be avoided if users take the time to adequately investigate the capability of a particular package, Schussel said. This process could easily take 12 man-months of a study team composed of an MIS manager, a user and a financial manager, according to Schussel, who urged study teams to interview users who have already purchased the package under consideration.

Foremost Advantage

A foremost advantage of packaged software is cost; the average package is priced in the $30,000 to $40,000 range — about one-tenth of what it would cost to develop in-house, he indicated. Implementation, particularly for system software, is much faster and easier, he added.

Moreover, maintenance is shared with the vendor. With some 80% of programmers' time now spent on maintenance of current programs, packaged software could bring a smaller MIS department staff or cause staff positions to be upgraded to such roles as business analysts.

However, there are pitfalls in acquiring packaged software, Schussel warned, pointing to overselling by vendors as one of the most serious abuses.

"You will have a tough time finding anyone who says he doesn't have a solution to your problem," he observed.

To Give Top Execs Access to Data

MIT Developing Concepts for Successful EIS

By Brad Schultz
CW Staff

CAMBRIDGE, Mass. — Top executives will want much more direct access to computer-stored data in coming years, and to run their companies, they will interpret more data themselves, an MIT researcher predicted here last week.

Few who presently run corporations have direct computer links, Dr. John F. Rockart noted. Top executives normally delegate the data interpretation functions necessary to monitor progress toward corporate objectives, but that will change fast, he asserted. Rockart directs the Center for Information Systems Research (CISR) at MIT's Sloan School of Management.

Speaking at the annual seminar in which CISR announces research results, Rockart said high-ranking executives will want interactive access to easily manipulable data bases. However, they will not want to learn arcane programming languages, he added.

Developing Concepts

Present or imminent technology can produce such executive information support (EIS) systems, he pointed out, but schools like Sloan are still developing the concepts from which methods for successfully managing the EIS systems of the future will come.

After studying 20 corporations for about two years, Rockart found a number of different approaches to managing the systems that support decision making, but he concluded that five elements were necessary for any of them to be managed successfully.

First, each corporation's EIS system required an "information support data base," containing occasionally incomplete tables of data that are easily accessible and changeable without needing frequent updates. In contrast, traditional transaction processing data bases must be complete and require frequent updates, Rockart said.

These data bases may not be easily accessible because they are stored to optimize efficiency of computer resources. (Hence, accessibility of data that supports decision making is sacrificed for the sake of overall throughput.) "Downstream" effects must be considered before transaction processing data bases are changed, Rockart observed, so change is often difficult.

User-Tailored Access

A second element common to successfully managed EIS systems was user-tailored access methods, Rockart told the seminar. Within an organization, different users need different access methods.

Successful EIS managers ensure that users get the access methods appropriate for particular applications, he indicated, by carefully choosing from the broad spectrum of available methods.

Third, systems specialists at companies with successfully managed EIS systems were found to have solid organizational support for training. Rockart suggested that many firms benefit from EIS "coaches" who help systems specialists stay in shape through appropriate educational programs and who help them tackle or prepare to tackle major projects.

Functioning like consultants, these coaches are oriented toward helping, not doing, Rockart emphasized. At one company the CISR director studied, many coaches had experience as professional consultants.

Coaches should be separated from the regular DP department, he indicated, lest they be forced into "emergency" development of overdue systems, destroying their image as hands-off advisors.

Fourth, Rockart concluded that companies with successful EIS have executives help determine the nature of data bases and access methods they will ultimately employ as end users. In contrast to the process of designing data bases and access methods for staff personnel and line supervisors, specifications for top managers must cover "uncharted ground," he remarked.

Manager Input Required

While conventional systems such as payroll processing are well understood, systems that help top managers run companies are not, Rockart said. Only the managers can express to systems developers what they must have to obtain the data necessary for managing, he maintained.

Finally, successful EIS systems are designed to allow graceful evolution as managers acquire new insights into what will help them run the company. This fifth element is crucial, Rockart indicated, because so little is known about the organizational dynamics of computing that no EIS system is likely to benefit the company if it is cast in concrete.

For more information on CISR results, Rockart can be reached c/o CISR, Sloan School of Management, MIT, Room E530420, Memorial Drive, Cambridge, Mass. 02139.

Truth is so obscure in these times, and falsehood so established, that unless we love the truth, we cannot know it.

— Blaise Pascal, *Pensees*

Under the shadow of a long-ago bloody war was born the man who would successfully design and build the first workable, automatic calculating machine — mankind's first baby step toward the electronic digital computer of today.

The year was 1623 and the war was Europe's Thirty Years' War, fought between the newly declared Protestants and hard-line Roman Catholics. Then in its fifth year, the conflict was to last another quarter-century after the birth of Blaise Pascal, the French scientist and philosopher whose mathematical and spiritual contributions would influence the world at least as much as did the conflagration that greeted his arrival.

Recognized today as one of the most eminent physicists and mathematicians of his time — having developed the theory of probability — as well as one of the greatest mystical writers in Christian literature, Pascal is best known to modern data processers as the developer of the first calculator.

Blaise Pascal was born in Clermont-Ferrand, one of three surviving children of Etienne Pascal, the prominent second president of the Court of Aides at Clermont, and his wife, Antoinette Begone. Blaise's grandfather, Martin Pascal, was the treasurer of France.

While Blaise's social position may have been guaranteed by birth, his health and survival were not. At the age of one, he became seriously ill with either tuberculosis or rickets and reportedly suffered some accompanying emotional problems as well.

Doctors found that the sight of water made him hysterical and he is said to have thrown frequent tantrums upon seeing his father and mother together. After an ill-fated attempt to cure his "sorcerer's spell" through witchcraft, time was allowed to heal the child to a full recovery, although ill-health was to plague him all his life.

When Blaise was four, his mother died, leaving her husband lonely and disconsolate. Etienne Pascal reacted by turning from his work and gradually assuming the full responsibility for his children's education.

In 1631, Etienne sold his post to a brother, transferred most of his property into government bonds and moved to Paris with his son and two daughters. There, the studies continued that were to lead Blaise to his prodigious accomplishments in physics and mathematics. Under the tutelage of his father — a talented mathematician in his own right — Blaise was taught to learn the purpose of a fact and its value before proceeding, or to "keep the boy superior to his tasks," in the words of his older sister.

Showing his genius early, Pascal at 11 conducted experiments and then wrote a paper on the cessation of sounds when vibrating objects are touched. While the child's natural curiosity drew him closer and closer to the subject of geometry, his father's unorthodox teaching methods called for the study of Greek and Latin first.

Etienne Pascal reportedly went so far as to lock up all his mathematics textbooks and asked his own friends not to mention mathematics in the presence of his son. He did, however, give Blaise a definition of geometry as the science of making true diagrams and of finding the proportions between them.

Armed only with that definition, Blaise began drawing circles and lines, and writing down observations about their relationships. Without benefit of a teacher, young Blaise discovered for himself the basic axioms of geometry. Still without benefit of a teacher, young Blaise went even further and proved the 32nd proposition of Euclid — that the sum of the angles of a triangle is equal to two right angles.

No longer could his natural talent and proclivity be ignored. Overwhelmed, Blaise's father immediately undertook to enlighten his son on the mysteries of geometry. From that point on, Blaise's intellectual devel-

'Computers' Go Back at Least 5,000 Years

The Seventeenth Century was not, of course, the first time man had grappled with the problem of making fast, accurate numerical calculations, although it was a vigorous period for mathematics because of the boom in navigation and commerce.

The earliest known mechanical counting aid is the abacus, traced back at least 5,000 years to the "cradle of civilization," the Tigris-Euphrates Valley in southwestern Asia. The abacus as we know it was invented in China around 2600 B.C. The Chinese version and the Japanese soroban — both extraordinarily fast — are still in use today.

The efficiency was pointedly illustrated during World War II, when Private T.N. Wood, the most skilled electric desk calculator operator with the American troops in Japan, pitted his talents against a Japanese soroban. Testing speed and accuracy against the soroban-wielding Kiyoshi Matsuzaki of Japan's Ministry of Postal Administration, America went down to dismal defeat.

In various forms, the abacus existed in all the civilizations of antiquity. In ancient Rome it was a grooved tablet while in China, Japan and Greece, it remains as a frame with beads strung on parallel wires.

In medieval England, a simplified form of abacus comprised a tablet ruled into spaces representing the positions of the counters, while coins, buttons or other small objects were moved to make the calculations. The checkered tablecloth, from which the British Exchequer derives its name, was originally a calculating device of this nature.

Also in England, approximately 2,000 years before the Middle Ages began, Stonehenge was erected on Salisbury Plain. Comprised of concentric circles of massive stones and other landmarks, the monument has long puzzled archeologists.

Considered by some an early astronomical calculator, Stonehenge has been shown — with the help of computers — to indicate the solstices and beginnings of seasons, as well as predict eclipses of the sun and moon. The arrows drawn in the illustration show the alignment of landmarks (stones, pits and the circles' center) that pointed to the rising and setting of the sun on the days of the summer and winter solstices.

A later astronomical computer, this one mechanical, was recovered from a sunken ship off the coast of Greece in the 1930s and attributed to the First Century B.C. The device contains carefully designed geartrains that evidently turned indicator hands on its front dials at speeds exactly analogous to those of planetary motions.

In the First Century A.D., Gerbert of Aurillac — a French shepherd boy who would later become Pope Sylvester — made the first attempt in

(Continued on Page 16)

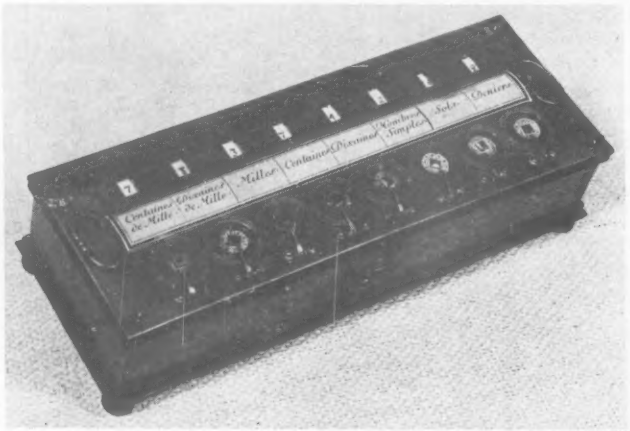


Photo courtesy of IBM

The Pascaline

opment skyrocketed. At the age of 12 he was appointed to a commission for judging procedures of determining longitudes; in the same year, he also uncovered an error in Rene Descartes' geometry. At the age of 13 he was introduced into the society of the Academie Libre, sitting in weekly to observe the brilliant French intellectuals of the day.

When Blaise was 16 the family's circumstances shifted somewhat in a fateful change that was to lead directly to Blaise's developing the automatic calculator.

The government bonds in which Etienne Pascal had invested most of his property suddenly lost value due to the French government's lowering the value of revenues in an effort to collect needed funds for itself. The resulting financial losses forced the family to move from Paris.

In Rouen, Etienne Pascal was appointed Royal Commissioner in High Normandy for the Tax Service, a post that called for monumental arithmetical calculations as part of his tax assessments.

While Blaise had been preparing to write a concise study of the entire field of mathematics, his father was now constantly requiring his assistance in the drudgery of hand totaling endless columns of numbers. The situation brought the young man's considerable problem-solving talents into play and he quickly realized the need for and possibilities of a mechanical calculating machine.

Although a number of men before him had attempted to make such a calculator, some got no further than written plans and some succeeded only to have the finished product destroyed, either by Nature or by human nature (see related story).

Blaise Pascal, however, only 19 when the concept formulated in his mind, worked and reworked various models of his calculator until he was nearly 30 — when he astounded all of Europe with his perfected, working model of an automatic, mechanical calculator.

The "pascaline," essentially like the calculators still in use only decades ago, arranged the digits of a number in wheels. When each wheel made a complete revolution, it would in turn shift its neighboring wheel one-tenth of a revolution, thereby totalling each digit counted. On the top of the box was a series of windows through which the totals could be read.

Although the machine incorporated eight movable dials, corresponding to the French system of currency at the time, calculations in the decimal system can be made by ignoring the two dials on the extreme right.

For example, to add 236 plus 422, one would first turn all the dials so that zeros appear in all the windows. Using the decimal system — starting with the third dial from the right — the user inserts a stylus into the slot marked 6, for units. The dial is then rotated clockwise until the stylus is stopped by a bar, as in dialing a telephone.

The next dial on the left, for the tens, is revolved from 3 until it stops. Finally, the next dial to the left, representing hundreds, is turned from 2 until it stops. At this time, the numbers 236 appear in the windows reading left to right. Should 422 be added and the process repeated, the windows would read the total, 658.

In order to subtract, a flat metal ruler located just above the windows is pulled forward, uncovering a second set of windows that are extensions of the first set. To subtract the number 1 from 3, the user turns the dials until 3 appears in the window. After dialing 1, the remainder, 2, automatically appears on the indicator.

The pascaline came to fruition only after more than 50 models had been constructed, some made of wood, others of ivory, ebony and copper. At least 10 of these are still known to exist. Connecting rods, flat metal strips — both plane and curved — chains, cones and concentric and eccentric wheels were all used throughout the many attempts, which resulted finally in a lightweight polished brass box, about 14 in. by 5 in. by 3 in.

The machine, which could add and subtract only, was based on extremely precise interconnected gears. The most difficult mechanism to incorporate was the ratchet device that communicated by one revolution of one wheel a movement of one digit to the wheel of the next highest order.

Blaise's sister described the ratchet concept as "the foundation on which nearly all the calculating machines have since been constructed." Her words held true for more than 300 years.

The arithmetical machine produces effects which approach nearer to thought than all the actions of animals. But it does nothing which would enable us to attribute will to it, as to the animals.

— Blaise Pascal, Pensees

"Will" or not, Pascal's accomplishment astonished all of Europe and won great acclaim for its inventor, although the great wealth he and his father assumed would follow never came. After all the years and large amounts of money that had been spent on developing the calculator, besides a widespread advertising campaign upon its completion, it was a complete failure in the business world.

Although Pascal had made the machine extremely simple to operate, potential buyers felt it was too com-

(Continued on Page 16)

Part 1 . . . The Life Of Blaise Pascal

By Marguerite Zientara
CW Writer/Analyst

Abacus Called First Computer

(Continued from Page 14)

abacus. Drawing on ideas he gleaned from the Moors, who then occupied Spain and Northern Africa, he spent many years trying to perfect his device, although it never worked accurately. He had 1,000 counters made of horn and arranged into 27 divisions. Since the concept of zero was hardly known at the time, his instrument proved to be not much better than hand operations.

There are reports of another Spaniard named Magnus who then took up the idea and around 1000 A.D. created a calculating machine of brass, in the shape of a human head, the figures of which appeared in the place of teeth. The priests of the day are said to have thought the device was something superhuman and smashed it with clubs, destroying all evidence of its accuracy.

The 1967 discovery of two bound volumes of Leonardo da Vinci's notebook materials in Madrid's National Library of Spain showed that the 15th century genius — never regarded as a contributor to the problems of calculation — did indeed address the question. His drawings describe a machine that would maintain a constant ratio of 10:1 in each of its 13 digit-registering wheels.

No working model is known to have existed, and experts doubt Pascal ever saw da Vinci's sketches.

In 1614, John Napier, Baron of Merchiston in Scotland, discovered the logarithm, by which mathematicians could transform multiplication to addition and division to subtraction. Logarithmic tables remained the basis for lengthy computations until the early 20th century, when mechanical calculators came into their own.

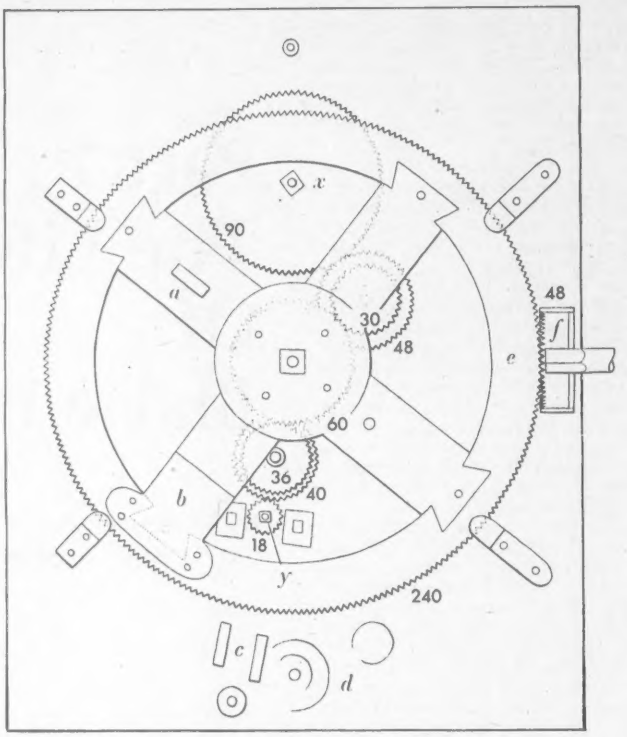
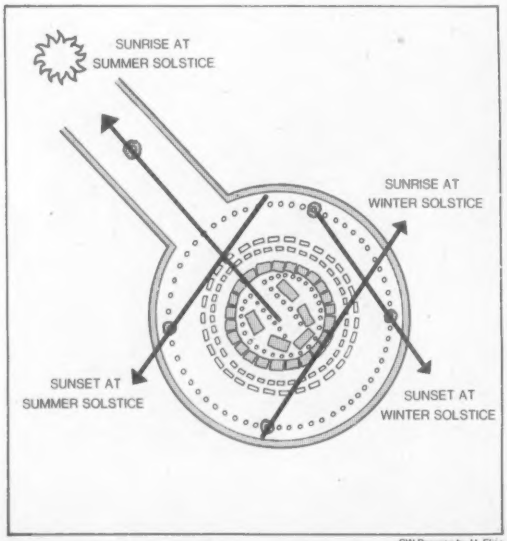


Diagram of a First Century B.C. Astronomical Computer (From "An Ancient Greek Computer" by Derek J. de Solla Price. Copyright © June 1959 by Scientific American, Inc. All rights reserved.)

Also developed by Napier was a device called "Napier's Bones," which amounted to a "lookup" table for multiplication. The "bones" were actually a movable multiplication table comprised of bone strips on which numbers were stamped. When placed into the proper combination, these strips could perform direct multiplication.

In 1623, the year Pascal was born, Wilhelm Schickard, a German professor of biblical languages and astronomy, designed a machine that reportedly could add, subtract, multiply and divide. Unfortunately, the model was destroyed in a fire and a new one was never built.



CW Drawing by H. Fling

Diagram of the mysterious Stonehenge, considered by some to be an early astronomical calculator.

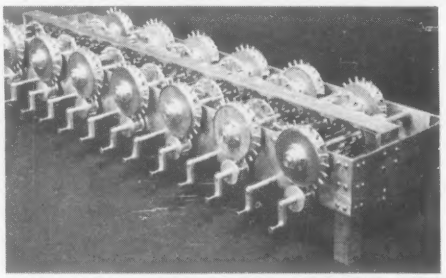


Photo courtesy of IBM

Leonardo da Vinci's Calculator (As Interpreted From His Drawings)

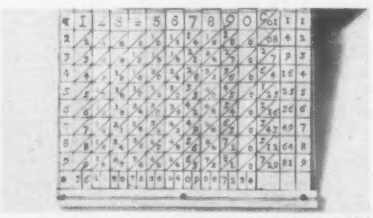


Photo courtesy of IBM

'Napier's Bones'

Pascal's Work Done by Age 30

(Continued from Page 15)

plicated and could be repaired only by Pascal. In addition, many claimed that human labor was still less expensive than the calculator that would replace it.

Furthermore, the machine reportedly suffered from lack of positive action. The setting wheels could be turned in error part way between digit positions, rendering it less than completely accurate. There was also an element of fear — similar to the anxiety expressed today about computers — surrounding the machine: Would it lead to unemployment among bookkeepers and other types of clerks?

That question was not to be answered in Pascal's lifetime since, even though the machine was praised in prose and verse, it was not snapped up by buyers to become a best-selling commodity.

While wealth did not flow to the pascaline's maker, fame took his name outside the intellectual community and into the consciousness of the entire world, a world that Pascal was soon to renounce.

At the age of 30, his many scientific accomplishments behind him, Pascal was seized by "a great scorn of the world and an unbearable disgust for all people who are in it." He instructed his family to regard his scientific interests as "the games and diversions of his youth," his sister wrote.

How wonderful it is that a thing so evident as the vanity of the world is so little known, that it is a strange and surprising thing to say that it is foolish to seek greatness? — Pensees

He devoted the remaining nine years of his life to God, wrote prolifically on spirituality and returned to science only briefly in an attempt to divert his mind from the intense pain of a serious toothache — one of several chronic physical ailments that had troubled him for more than a decade. For eight days, Pascal concentrated exlusively on mathematics and succeeded in solving many of the problems surrounding the geometry of the cycloid.

By 1658 his health was steadily deteriorating. Although he continued to write or dictate his religious observations, he was never again to return to mathematics.

In 1662, at the age of 39, Blaise Pascal died of a brain hemorrhage. The great mathematician who buried his talents in deference to what he regarded as the real purpose of his life uttered his last words: "May God never abandon me!" — Pensees

The last act is tragic, however happy all the rest of the play is; at the last a little earth is thrown upon our head, and that is the end for ever.

Next: Gottfried Wilhelm Leibniz

Declaration

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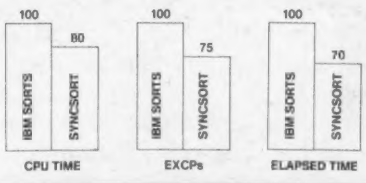
Chart of the Month:

Performance Comparisons



When we introduced SyncSort OS back in 1971, it proved to be "the sorting shot heard 'round the world." Although we didn't know it at the time, we were starting a sorting revolution that continues to this very day.

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User Gets Three Software Vendors to Cooperate

By Rita Shoor
CW Staff

KENNEWICK, Wash. — Getting three software vendors to cooperate without finger-pointing when something goes wrong at a multivendor installation can require the patience of Job and the political sophistication of Machiavelli. But David Bernard, systems manager at Kennewick Industrial and Electric Supply, Inc., had a totally different experience.

Bernard was hired in March 1980 to evaluate whether "[automated] DP was the way to go for this company."

Confronted by inventory that averaged approximately $3 million in 10 different warehouses at any given time, he recommended looking for a system that would bring automation to Kennewick "without changing the company's basic structure." It also had to be "flexible enough to grow with the company," he noted.

A wholesaler, retailer and distributor of building supplies, the company carries some 35,000 different items. Trying to control them with a manual system was an "all-consuming task." But little more than a year ago the only concession to automation at Kennewick was a Model L6500 ledger posting machine from Burroughs Corp., he said. It is fair to describe Augustine Kittson, company president, as a "very conservative person," Bernard noted.

Going from this "technology of the '60s" to today's automation techniques seems to have paid off with a system that handles all accounting applications, purchasing, payroll, on-line inventory updates and a real-time order-entry system that "will price 35,000 items at 130 different price levels automatically," he said.

Most of the 12 vendors Bernard initially contacted were OEMs because he wanted the software and hardware to come from the same source. "I didn't want to get into a situation where two manufacturers are blaming each other" if something goes wrong, he explained.

There were "specific in-house requirements for the bid process," he recalled. First, both sales and service had to be locally available. Second, the software had to be capable of merging with the current organizational framework. "DP should service the existing structure without changing it" was his philosophy. Finally, the firm insisted on real-time, on-line point-of-sale and inventory updating capability.

Out of bids ranging from about $48,000 to $250,000, the contract went to Columbia Computer Associates (CCA) in Pasco, Wash. The first system included Datapoint Corp.'s 128K-byte Model 6600 processor, an operating system and time-sharing software from the same vendor and application packages written by Seattle-based Allen Co.

Just the Beginning

That was just the beginning. Upgrades followed each other in quick succession, according to Bernard. By September, processor storage had doubled to 256K bytes and two months later, Kennewick went from eight-terminal to 16-terminal capability.

At that point, Datapoint's announcement of its Datashare 6 time-sharing system [CW, Sept. 22, 1980] captured Bernard's special interest. Under the vendor's Utility Partition Supervisor (UPS), Datashare 5 only recognized 128K bytes, which limited Kennewick to eight terminals, he said. But Datashare 6 handled 256K bytes, making Bernard "very interested."

There was one glitch, however. Whenever nontime-sharing processing was required — at month-end, for example — the system executed a "roll-out" to go from Datashare to Datapoint's disk operating system (DOSD). Time-sharing was interrupted until the other processing was complete and a "roll-out return" was executed. This meant a "horrendous master scheduling program" to keep track of things, Bernard said.

He knew about the potential problem before Kennewick agreed to serve as a Datashare beta test site and decided to get rid of the roll-out while avoiding the expense of installing Datapoint's Attached Resource Computer (ARC) system.

That may sound like a tall order, but Bernard seems to have done it with help from Datapoint itself and two other software vendors. He began with a Datashare Monitor for UPS from Applied Information Services (AIS) in Tigard, Ore. It had already been "tested, proven and run under Datashare 5." The second component was Allen Co.'s new version of Operation Control System (OCS).

In effect, Bernard wanted DOSD and the time-sharing system to talk to each other. This was accomplished via vendor-coded modifications to the purchased packages. OCS now issues the roll-out command from the job queue file and information is passed back and forth "without interrupting the time-sharing system whatsoever."

"Everyone is cooperating," according to Bernard. It was only three weeks "from the time we got beta until all software was up," he said. There were no problems with either AIS or Allen in modifying their systems and "Datapoint is certainly supporting us with everything they've got," he continued. So far, he has only experienced "minimal problems."

CCA also came in for its share of praise. The OEM customized the on-line order entry application software "very heavily" as part of the original contract, he said.

If Kennewick expansion plans go through, it will probably wind up with a central ARC system, he said. However, he has a two-year breathing space with a software combination costing "about one-tenth of the ARC system," he claimed.

HP User Meet Set for Sept. 2

SALT LAKE CITY, Utah — The Hewlett-Packard Co. user group will focus on overall optimization of HP-3000 computer system installations, including system, program, programmer performance and site management and operational optimization at its Sept. 2-4 conference here.

The meeting will be cohosted by the University of Utah and the HP Bonneville Regional Users Group .

In addition to the optimization seminar put on by HP's factory performance specialist team, the conference will feature papers presented by members of the HP-3000 user community.

More information is available from Conferences and Institutes, Division of Continuing Education, University of Utah, Salt Lake City, Utah 84112.

End Users Seen in New Role

DPers Warned Not to Resist Power Dispersal

By Jeffry Beeler
CW West Coast Bureau

BERKELEY, Calif. — Like it or not, computing shop managers can ill afford to resist the growing movement toward decentralized processing, according to Del Monte Corp.'s director of management information systems (MIS).

"Fighting the dispersal of computing power will merely cut us off from our users and prevent us from influencing the outcome of that dispersal," Fenwicke Holmes told his fellow information systems managers during a recent meeting of the Structured Methodology Users Group here.

In a keynote address dealing with the subject of automated office productivity, Holmes warned information systems directors to expect more and more of their departments' application development tasks to be off-loaded soon to nontechnical end users.

Holmes foresees the day when a typical corporate computing shop will limit itself primarily to producing data bases and I/O controls, while end users will increasingly assume the burden of writing their own programs.

"Users are frustrated, and there are more of them than there are of you," the Del Monte computing chief told his listeners. "There are also many more applications out there than your department can possibly program."

But to enable end users to develop most of their own applications, computing professionals first need to find a very high-level alternative to their field's most popular programming language, Cobol. "Someday, we're going to have to leave the Old Testament behind," Holmes said.

Need for Efficiency

The MIS director declined to speculate about which "language of the future" will ultimately emerge as Cobol's successor, but did predict the replacement would have to provide much greater efficiency and many more ease-of-use features than its present-day counterpart.

Holmes also voiced concern that many information systems managers might resist a future migration from Cobol, which, he said, ranks as one of the computing field's leading "sacred cows."

Increased end-user involvement in the application development process will play a key role in bringing about a much-needed increase in information systems productivity, Holmes continued. Thus, computing professionals have a strong incentive to help users acquire their own processors and programming capabilities.

But to reap the full benefits of decentralized processing, systems departments need to make sure that the dispersal of computing power is managed intelligently and proceeds smoothly.

"It's going to be a users' world during the next 10 years," Holmes predicted. "Users are going to possess a lot of tools for developing their own programs, but if they don't know how to reduce a systems problem intelligently, we're going to have chaos."

Users of Structured Methodology Delay Walkthroughs: Consultant

By Jeffry Beeler
CW West Coast Bureau

BERKELEY, Calif. — Many users of structured methodology make the mistake of not conducting their first walkthroughs until they begin writing code or until their programs are already written, according to internationally known consultant Gopal Kapur.

But to have maximum impact, structured walkthroughs should be implemented from the very beginning of the application development cycle, Kapur said during his consulting firm's annual Structured Methodology Users Group meeting.

Tardiness in initiating walkthroughs can lower a computing department's programming productivity and unnecessarily compound its systems development headaches, Kapur told the 70 or so attendees at the recent conference.

An estimated 64% of all program bugs originate during systems analysis and design. So users who delay their first walkthroughs until their application development projects are nearly complete can be likened to building inspectors who try to examine a house's internal framework after its wallboard has already been installed, Kapur said.

Ideally, systems developers should strive to detect and correct their program flaws as soon as they occur to minimize their long-term impact and to simplify the task of software debugging. "The sooner in the development cycle you can spot systems defects," Kapur noted, "the higher your programming productivity."

But to catch program errors early, computing departments have to begin doing walkthroughs as soon as they finish writing a new application's specifications. They should also do walkthroughs immediately after they complete all hierarchical diagrams, pseudocode, compiled source code and system testing.

During the early phases of an application development project, many users apparently rely less on walkthroughs than on machine testing to help them eliminate program bugs. Kapur criticized the overuse of machine testing as "futile."

Machine Testing

Although machine testing is well adapted to pinpointing defects in logic and design, it is ill-suited to finding errors that stem from poorly written user specifications.

Thus, if a computing department postpones the use of walkthroughs and makes a systems mistake early in the application development cycle, the bug will likely escape notice until the project in question is nearly complete. In fact, the goof stands a good chance of never being caught at all, Kapur said.

Computing departments should take great pains not to let flawed specifications or systems designs work their way through to the end of an application-development effort. "The longer it takes you to discover an error, the more trouble that error causes," the consultant said.

In other remarks, Kapur advised systems developers to limit the duration of their walkthroughs to one hour and to restrict the number of work group participants to six or fewer. He also urged computing department heads to make participation in walkthroughs mandatory for systems analysts and programmers.

Watch Computerworld on TV This Week:

- ***Apples aweigh! Computer-assisted design techniques have changed long-standing traditions at the world's largest sail maker.***
- ***Bandit at one o'clock! — Players of computer games are finding it tough to break away from the fantasy of shooting down alien invaders.***

City	Station	Channel #	Day	Time
New York	WPIX	11	Saturday	9:00 AM
Chicago	WSNS	44	Tuesday	6:30 PM
Los Angeles	KWHY	22	Saturday	12:00 Noon
San Francisco	KTSF	26	Saturday	9:30 AM
Boston	WXNE	25	Wed.	10:30 PM
Washington, DC	WDCA	20	Saturday	12:00 Mid.
Philadelphia	WTAF	29	Monday	10:30 PM
Dallas/Ft. Worth	KNBN	33	Tuesday	5:30 PM
Detroit	WXON	20	Saturday	10:00 AM
Minneapolis/ St. Paul	KMSP	9	Saturday	TBA*
Houston	KHTV	39	Monday	12:00 Mid.
St. Louis	KDNL	30	Sunday	5:30 PM
Atlanta	WANX	46	Tuesday	11:00 PM

*Check local listings for time.

Managers on the Move

ROBERT DAVIDSON has joined U.S. Pioneer Electronics Corp., Moonachie, N.J., as director of management information systems, where he will assume responsibility for the entire operation of the Data Processing Department.

A fifteen-year veteran of the information systems field, Davidson worked thirteen years with Volkswagen of America, where his most recent post was information services planning manager.

A graduate of Fairleigh Dickinson University, he holds both an M.B.A. and an M.S. in business.

•••

ROBERT G. McCARTHY has been named manager of computer services for National Grange Mutual Insurance Co. (NGM) in Keene, N.H. In the newly created position, McCarthy will be responsible for all NGM computer services, including scheduling and tape management functions and all operations.

McCarthy brings to the post more than 10 years of computer operations experience. He joined NGM from the Foxboro Co., where he most recently served as computer operations manager.

A native of Massachusetts, McCarthy recently earned his bachelor's degree in business management from Johnson and Wales College in Providence, R.I. Prior to that, he served four years in the U.S. Navy.

•••

VIRGINIA E. MARTING has joined Computer Sciences Corp. (CSC) of El Segundo, Calif., in the newly created position of corporate director of management information systems. She will now direct the development and maintenance of computer-based information systems used throughout the company's internal operations.

Marting comes to CSC from Engelhard Minerals & Chemicals Corp. in New York, where she held a similar post for the last four years. She has held executive and senior technical positions in South Africa, Canada and the U.S. during her two decades in data processing. She is also the founder of the first computer software and consulting firm in South Africa, which operated from 1963 - 1976.

Marting holds a B.S. in chemistry from the University of Cape Town, S.A., and a master's degree in physics, from the same university.

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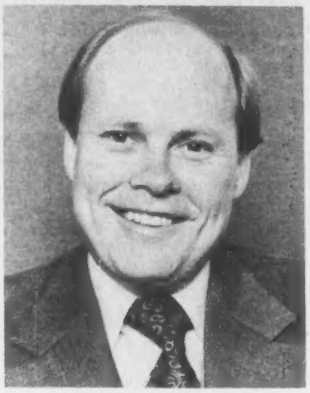
RICHARD D. McATEER has been promoted to manager, home office information services, in Bethlehem Steel Corp.'s accounting department, Bethlehem, Pa.

He advanced his career via several



Robert Davidson

positions in the order division, sales, corporate data processing, accounting and data collection/transmission departments. McAteer became assistant manager in 1971 and was promoted to manager of planning and administration in 1974. He then managed DP services at the corporation's Sparrow Point, Md., plant where he was later named superintendent of plant information services until his current appointment.

A native of Wilmington, Del., McAteer received a B.A. degree in mathematics from King's College.

•••

DOUGLAS E. VAN HOUWELING has been named the new vice-provost for computing and planning at Carnegie-Mellon University in Pittsburgh.

In his new position, Van Houweling will be responsible for the entire university computer system including management, design and implementation of computing facilities in support of research, instruction and administration. Before joining Carnegie-Mellon, he was director of academic computing at Cornell University.

Van Houweling is the author of numerous articles on computer services and simulation and has lectured widely on these topics.

Users Video Journal Geared to Managers

OAK BROOK, Ill. — A series of video journals on "User Responsibilities in Information Management" is available from Deltak, Inc. Designated 62-OXX and coproduced by The Diebold Group, Inc., it discusses the role of users in the attainment of effective information management.

The series focuses on user responsibilities in communications, planning, implementation and support.

The nontechnical series is aimed at executives, user management, middle management and senior professionals. It uses a video format and a short text is included with each videotape for review after completion, which can be expected to take three hours, the vendor said.

It is available for purchase or rental through the vendor's Deltavision plan. The series costs $1,750 for purchase or between $50 and $125 for monthly rental, Deltak said from 1220 Kensington Road, Oak Brook, Ill. 60521.

Corrections

Informatics, Inc. has informed *Computerworld* that its Data Services Operations does actively market and support the Simplan package ["RDC Profiles Finance Planners," CW, May 4].

Neil Gorchow has been appointed vice-president and general manager of minicomputer operations at Sperry Univac [CW June 15].

Facilities Planning Course Set for July

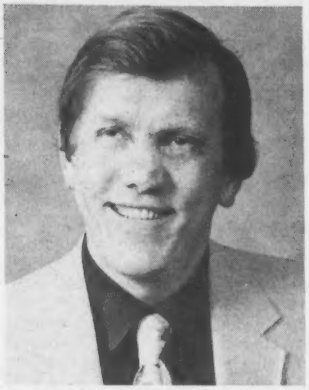
BERKELEY, Calif. — An intensive three-day course entitled "Computer-Aided Facilities Planning," taught by industrial planning consultant Lee Hales, will be offered here July 27-29. The program is sponsored by the University of California Extension.

The course is designed for those responsible for facilities planning, layout planning or facilities management who need the latest information on computer support, according to the university.

Registration is limited and advance enrollment is necessary. Materials and lunches are included in the $595 course fee. Further details are available from Continuing Education in Engineering, University of California Extension, 2223 Fulton St., Berkeley, Calif. 94720.

Managers on the Move

ber of the American Political Science Association, the Society for Computer Simulation and the Association for Computing Machinery.



Robert G. McCarthy

After earning his B.S. in physics and government from Iowa State, Van Houweling received his Ph.D. in political science from Indiana University.

•••

KAREN THOMAS has been appointed vice-president, management services, for Aratex Services, Inc. in Encino, Calif.

Thomas is now responsible for data processing department and management support services to Aratex field operations. She spent the last eight years with Toughe Ross as part of that firm's management consulting group. Prior to that, she was a systems analyst with Procter & Gamble.

Thomas holds a B.S. degree in mathematics from West Virginia University and is a member of the Society of Women Engineers.

•••

ROBERT G. KELLER has been promoted to corporate director, computer operations/technical services, at Mallinckrodt, Inc. of St. Louis, Mo.

Keller, who joined Mallinckrodt in 1969, has achieved his CDP, a professional attainment program for data processing.

•••

HASSAN A. KAHN has been promoted to the position of manager, computer services, at M.W. Kellogg Co.'s Research and Development Center located in Houston, Texas.

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Recent promotions at Greyhound Corp. include HARRY OAKES' move to vice-president/office systems with responsibility for the administration of office services for Greyhound's Phoenix headquarters and STEPHEN P. FINN's election to vice-president/information systems.

Oakes began his career at Greyhound in 1962 as a systems analyst and has served in a number of executive posts. Holder of a B.S. degree in education from the University of Arkansas, he also earned an M.B.A. from Northwestern University. Finn, who will now head up the activities of the corporate data center, came to Greyhound in 1970 and most recently served as executive director of information systems. He received a B.S. in business administration from Northwestern University in 1968.

Oakes and Finn are assuming the duties formerly assigned to Earle Trulove, vice-president of systems and services, who retired in February after 44 years with Greyhound.

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L.R. PARSLEY has joined Utility Data Corp., a division of Ridgeway's, Inc. of Houston, as director of operations.

Parsley was previously manager of data base applications in the systems development group at Geosource, Inc.

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EUGENE G. SENECAL has been named vice-president of management information systems at Ames Department Stores, Inc., headquartered in Rocky Hill, Conn.

Senecal was a systems programming manager for Advo Systems prior to joining Ames. He is a member of the Data Processing Management Association and the Association of Systems Management.

EFT Users Get Research Directory

SAN RAFAEL, Calif. — An information and research service that gives electronic funds transfer (EFT) professionals a resource to keep current on developments in branch terminals, automated teller machines, point-of-sale and home banking services is being offered by The Parsons Consulting Group.

The EFT Executives' Directory provides an organized system for retrieving information and is supplemented with bimonthly updates and executive summaries. The directory reports on the activities of hundreds of banks, savings and loan associations, credit unions and service organizations in two-page reports on each institution.

Recent legislation, manufacturers and their product lines are also included in the directory.

Subscribers will also have access to an Inquiry Service that makes available data on thousands of institutions.

The subscription fee of $375 includes the directory, the bimonthly updates for the first year and use of the Inquiry Service. More information is available from *The EFT Executives' Directory*, P.O. Box 3732, San Rafael, Calif. 94912.

Theme Announced For Info Exposition

NEW YORK — "Increasing the Responsiveness of Information Systems" will be the theme of this year's Information Management Exposition and Conference (Info) at the New York Coliseum, Oct. 12-15.

Conference topics plus hardware and software exhibits will be attuned to this theme, according to the Info sponsor, Clapp & Poliak, Inc.

This year's show will feature a special section devoted solely to prepackaged and customized software, to be called the Software & Applications Center. Additionally, there will be consultancy centers for visitors who need help on the selection of software.

More information on Info can be obtained from Clapp & Poliak, 245 Park Ave., New York, N.Y. 10167.

'Computer Input/Output' Special Needs Reader Input

The Aug. 31 Special Report, "Computer Input/Output" cannot be put out without your input.

Input and output is what you make it. What have you been doing to save time and money — for example, with plotters, printers, computer output microfilm, microfiche and voice recognition?

Computerworld's readers want to hear your experiences and ideas. Do you have a tutorial, application story or personal reminiscence about computer input/output you can share?

The copy deadline is July 10, so hurry and send your stories — five to seven typed, double-spaced pages — to Bruce Hoard, Editor, August Special Report, *Computerworld*, P.O. Box 880, Framingham, Mass. 01701.

Pictures and illustrations are welcome.

Local-Area Networks Explored

By Bruce Hoard
CW Staff

LANCASTER, Pa. — "Much used and abused" was how Dr. Tsvi Lissack described the lexicon surrounding local-area networks.

Director of distributed processing engineering at Network Analysis Corp. (NAC), Lissack tried to set the record straight on perhaps the hottest topic in data communications when he spoke here at the recent Association of Data Communications Users meeting.

Lissack warmed to his subject by explaining that voice and data transmission are currently separated in most corporate communications networks. He cited an 80%:20% voice/data ratio, predicting it will swing more heavily toward data in the near future.

The integration of voice, data and additional applications such as facsimile and video into a broadband network will allow uniform access to all applications and open the door to even more of them, he maintained. One possibility would be voice activation of various computer devices.

Such networks do not yet exist. "What I'm talking about is somewhat futuristic," he commented.

A local-area network is confined to a short distance, usually no more than 3,000 ft, Lissack said. The ideal settings are college campuses and large buildings. Because the user owns his own transmission equipment, there is an unregulated environment.

On top of that, bandwidth is not limited (local-area networks may be broadband or baseband), and multiaddressing is possible. "Everyone can talk with anybody," Lissack noted. Bit error rates are also very low.

Wide-Open Applications

Office automation and distributed data processing (DDP) are the two most wide-open applications looming in the immediate future for local area networks, he said. The advantage is simple access to long-haul networks for all computers and terminals, through the gateway commonly found in the networks.

Discussing hardware, Lissack mentioned several components including network interface processors, which are used to access the system; and network control or central control processors, which provide application-like logical addressing and traffic analysis.

Lissack distinguished between the terms gateway and bridge, which are often used interchangeably. In his opinion, a bridge is something used to connect two similar networks, while a gateway connects two dissimilar entities such as a local-area network and a long-haul or satellite network.

The choice of transmission technologies is perhaps the most crucial when building a local-area network. The three in use are fiber optics, coaxial cable and twisted-pair wiring.

Twisted pairs are used in baseband networks, which feature narrow bandwidth and high error rates unless the lines are well shielded, he noted. Transmission speeds up to 100K bit/sec are possible over an area of approximately 3,000 ft of cable.

To expand that range, two cables are needed. Another channel is also needed for each additional application. Twisted pairs are more susceptible to electromagnetic interference than broadband networks.

Fiber-optic cable used in broadband local-area networks features wider bandwidth and unidirectional communications. However, two cables are needed for full-duplex transmission, Lissack declared. A fiber-optic network is highly resistant to terminal and electromagnetic noise and is difficult to cut into and tap.

Although the latter quality bodes well for security purposes, it makes the task of establishing a multidrop network more arduous. Fiber optics are the most popular form of local-area networks transmission technology in use today, Lissack noted.

Broadband coaxial cable similar to the kind used by CATV cable stations is also a viable option, he added.

A typical local-area network in a high-rise building might include a satellite antenna gateway on the roof and a backbone network running up and down the elevator shaft with four-way splitters connecting the main line with each floor.

He touched briefly on access schemes, mentioning carrier sense multiple access with collision detection and token passing, saying both are currently in use. Despite the range of alternatives, Lissack had a warning to users: "You don't have all the choices in the world because vendors will actually limit you in what you can choose."

Put Another Nickel in . . . In the Vending Micro Machine?

By Lois Paul
CW Staff

PHILADELPHIA — Rather than feeding coins into electronic games to save the world from space invaders, people now can put their money into a slot in a microcomputer and buy computer time.

Test models of this vending machine computer have been installed in libraries, but the future possibilities include hotels, shopping malls and office buildings, according to William Zimmerman, president of Copy Systems, Inc., a company here that supplies vending photocopiers to libraries and colleges.

The vending machine idea originated with Zimmerman about three years ago when he and his staff took a Radio Shack TRS-80 microcomputer and equipped it with a vend interface that he said can be attached to "any mini and micro in the country."

He formed Compuvend with Ralph Weed, another Phladelphia businessman, and applied for a patent on the vend interface, which is a computer table and a vending box. "Eventually, I probably do see competition, but they have about three years to catch up on," he said.

By September, Compuvend will be marketing the Series 10, which accepts coins, and the Series 20, which accepts dollars, Zimmerman said.

The owner of the computer can control the vend rate and the amount of time the user purchases. The interface also can be set to accumulate time for extra coins or bills.

The company currently is working on the Series 30, which will include a modem to support a remote user capability and will be available with a credit card device. He predicted this unit will be ready within six months to a year.

Compuvend is negotiating with three computer manufacturers at this point, Zimmerman said, but no definite arrangements have been made for basing the units on any particular equipment.

The units equipped with vend interfaces will cost about $1,500, he predicted. The price for the interface alone has not yet been finalized.

Their Technical Expertise Needed

Office Seen Opportunity for Telecom Managers

By Bruce Hoard
CW Staff

LANCASTER, Pa. — Telcommunications managers who capitalize on their technical expertise will rise to prominence in the office of the future.

How so? According to Thomas Tenhunfeld, vice-president of Corporate Communication Sciences, Inc., the role of the office automation manager will be a very technical one in the next five to seven years. And that is where telecommunications managers have been given an entree into the office area, he explained at the recent Association of Data Communications Users meeting here.

Office automation technology is still too new for most companies to have acquired in-house expertise to deal with it — other than telecommunications managers, he claimed. "If you're already a technical manager, you become a very logical candidate for that role."

With top management just now finding out about office automation, technical managers will be of great value, but only at a functional level and for a finite period of time. He thus warned technical managers against trying to move out of technical positions, saying they would encounter resistance from their organizations if they do.

"I think management is smart enough to know there is a shortage of technical managers so the good news is you've got job security, but the bad news is I don't know what the hell you're going to do with it."

Telecommunications managers will also become more prominent as communications functions are increasingly integrated into the overall DP budget, Tenhunfeld explained. With their knowledge of both disciplines, they will once again be the logical candidates to assume more responsibilities, he said.

People Factor Crucial

With such innovative services as voice-to-text systems still "on the horizon," the people factor is still crucial to office productivity, Tenhunfeld noted. "No matter what we do with the technology, we can't create productivity where there was none before."

That is where the telecommunications manager-turned-office automation manager can be of considerable value. For example, there are two communications peaks each business day, early morning and early afternoon, he explained. Those peaks also coincide with the most productive parts of each day.

Using their "rudimentary" skills, the former telecommunications managers can monitor the telephone activity on a single circuit and, over time, judge when people are most and least productive. With that knowledge in hand, they can implement technology designed to boost productivity during off-peak hours.

Tenhunfeld said office automation is far more than just word processors and electronic mail. "Office automation in its strictest sense deals with the automation of any traditional office function."

The problem for telecommunications managers moving into office automation is that some of them are not willing to take on all the functions associated with the office of the future, he said. Besides electronic mail, there are other functions such as conventional mail and labeling systems to consider, he warned.

Vt. College Says No Thanks To NSF Grant for DP Project

LYNDON CENTER, Vt. — Janet Murphy looked the government gift horse in the mouth and walked away.

Murphy, the president of Lyndon State College here, turned down a $143,000 grant from the National Science Foundation (NSF) that would have been spent on a computer literacy program at the college. But too many governmental strings attached to the grant pushed the price of the project out of reach, and she is now seeking alternative funding.

The goal, according to Murphy, was to provide a computer literacy opportunity to all departments of the college. However, when Gerald Koeppl, acting director of the project at Lyndon, presented a plan for the project that called for about $312,000, Murphy decided to forfeit the NSF grant and start over.

"We felt we couldn't afford it," she said. In addition to the demands made upon the institution by the grant guidelines, Murphy cited President Reagan's cutbacks as affecting small institutions like Lyndon.

Koeppl recently resigned to take a research job and this has motivated Murphy to step up the search for alternatives to the NSF program.

She contacted Digital Equipment Corp., which has agreed to fund 50% of the equipment for the new project. Murphy said that whereas the NSF project plan involved purchase of a mainframe DEC computer, the revised plan involves purchases on a smaller scale.

She said the maintenance costs of the plan currently envisioned will be much lower than those the original plan would have entailed.

To date, the Vermont state legislature has allocated $20,000 for Lyndon State's project and it is anticipated that the Vermont state college central office will be contributing funds.

All Departments

Because the NSF is no longer participating in the project, all of the college's departments will be involved. Previously, only mathematics, science and meteorology students would have benefited.

"Our feeling is that everyone graduating from college now is required to have some knowledge of computers," Murphy said. Lyndon State is looking into the possibility of including a computer education curriculum and, eventually, a two- or four-year program.

She said a number of those inquiring about the college have asked about computer programs and she feels this would help the school attract more students.

Currently the search is on for a director of academic computing for Lyndon State who will work with the faculty there, teach several courses and "generally get computer literacy off the ground," Murphy said.

Murphy said she is having a meeting next week to further direct the alternative program. The college will be purchasing DEC equipment later this month.

In the $25,000 to $50,000 Range

TI's Model 4 Combines Simplicity, Flexibility

By Hillel Segal
Special to CW

One of the most common drawbacks of systems in the $25,000 to $50,000 range is that they often sacrifice simplicity to provide flexibility. However, Texas Instruments, Inc. has succeeded in creating a system that is both versatile and easy to use — the DS990 Model 4.

Most of the credit for the simplicity of the Model 4 goes to the DX10 operating system. The system's versatility stems from a host of programming languages and modularly designed hardware that provides excellent opportunities for expansion.

The Model 4 is the third computer in the $25,000 to $50,000 range that the Association of Computer Users (ACU) has reported on for *Computerworld*. The particular system tested by our consultants cost $36,635. This system included the 990/10 processor with 256K bytes of main memory, a 9.4M byte hard disk drive, eight TTY/EIA terminal interface modules, a 911 video display terminal, a 150 char./sec printer, and the DX10 operating system. With eight terminals, the price would have been $46,355. In addition, each programming language costs about $2,500.

The results of ACU's speed tests are shown in the scorebox. In these particular tests, an order entry program was run simultaneously with a CPU-intensive program (with eight terminals connected). The time for the order entry program represents the time it took the system to respond to a 12-line transaction. (To get the response time per input line, divide the figure by 12). The measured time for the CPU-intensive program is the average time to complete 3,000 iterations of a computational loop.

The Model 4 scored very well on the order entry test. On the CPU-intensive program, however, the Model 4 appears to be much slower. It should be noted, though, that the times reported were from programs written in Cobol.

SCOREBOX

System: TI DS990 Model 4
Current Price: $36,635 with one terminal
$46,355 with eight terminals

Series 3 Results — **Test E-4**

	CPU-Intensive (Run in Background)	Order Entry Response Time (8 Terminals Simultaneously)
	Time	**Time**
Wang 2200MVP	16.4 sec	4.6 sec
IBM Series/1	*	*
TI DS990 Model 4	135.2 sec**	4.3 sec**
Hewlett-Packard 250	To be covered in future issues	
DEC Datasystem 355		
Alpha Micro AM-100T		

* Programs could not be run properly because of a loss of characters in the order entry processing.
** For programs run in Cobol; the respective times in Pascal are 68.1 sec and 3.9 sec.

This is the 31st in a series of articles giving the highlights of benchmark tests conducted on popular, small computer systems. The full reports were originally published by the Association of Computer Users, a 4,000-member nonprofit organization.

When our consultants ran the same tests on the same machine, but with the programs written in Fortran and Pascal, the CPU-intensive times were cut in half. With a system as flexible as the Model 4, speed is often determined more by the software configurations than by any intrinsic impasted by the hardware.

One of the most impressive facets of the Model 4 is its carefully designed human interface. Both in the hardware and in the software, it is clear that the engineers took special care to make the system "friendly." This is noteworthy because they apparently accomplished this task without losing power or flexibility.

Two parts of the system that received high scores from the users we interviewed were the terminal and the operating system.

The 911 video display terminal comes with cursor control, three programmable levels of intensity, and ten programmable function keys. In addition, it has separate cursor and numeric pads and a detached keyboard. Its green-phosphor screen is easy on the eyes and the feel of the keys is excellent.

The DX10 operating system utilizes a menu-driven approach for inexperienced users. The more experienced user can bypass the step-by-step hierarchy of menus by simply entering the desired commands.

Another useful feature provided by DX10 is what TI calls "Procs." A Proc is a file constructed by the user consisting of commands from the System Command Interpreter (SCI). By "calling" the file, a user can activate the SCI primitives. With the ability to perform loops and test counters, Procs can be extremely powerful tools.

DX10 supports a variety of languages and utilities including Cobol, RPG-II, Basic, Pascal, DX10 TPL, a sort/merge program, a data base management system and a text editor. TI does not offer application software, but there are numerous packages available through OEMs.

As mentioned before, the development software is not included in the base price of the system. Each language costs between $2,000 and $3,000, which covers the initial license fee, documentation and one year of subscription/support service.

Language Pleased

The users we contacted were pleased with the languages they were using (mostly Cobol and Fortran). One user did remark that TI's Pascal has a very long compile time.

In addition to software adaptability, the Model 4 also offers flexibility in its hardware configurations. The standard Model 4 comes with either 256K- or 128K bytes of central memory. However, additional modules of 64K- or 128K bytes can be purchased, bringing the total memory capacity up to 2,048K bytes. Coupled with DX10's mapping procedure that dynamically allocates memory, this is a tremendous amount of central memory for a computer of its size.

Three disk drives are available, providing anywhere from 10M- to 89.2M bytes of storage. The only limit to the number of drives one can put on the Model 4 is the number of slots available in the chassis. Each slot is capable of housing a disk controller, and each controller can accommodate either two or four drives, depending on the model.

TI offers three hard copy terminals. The 810 printer that we used in our tests features bidirectional printing and buffered reception. Models 2230 and 2260 use TI's Silent 700 thermal printer and provide speeds of 300 line/min and 500 line/min respectively. Customers found the printers reliable and easy to use. TI also offers a card reader and a variety of communications interfaces.

The Model 4 users we interviewed were very enthusiastic about their machines. They found the Model 4 easy to use, fast and capable of handling their growth plans. The only negative comments came in regard to the documentation. Here, the users were split; half felt the documentation was good while the rest believed there was definite room for improvement. TI's documentation tends to be oriented toward the inexperienced user.

In sum, TI's DS990 Model 4 is versatile both in its hardware and in its software configurations; users report it to be reliable and it is relatively fast.

Hillel Segal is president of the Association of Computer Users, a nonprofit association with members in the U.S., Canada and several other foreign countries. A package of information about the Association of Computer Users is available from the group at P.O. Box 9003, Boulder, Colo. 80301.

DPers Chastised for Neglecting Corporate Goals

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — A DP manager should remember that his job — his only job — is to help his organization meet its goals, MCI Communications Corp. President V. Orville Wright said recently.

Wright told the second annual Information Resources Management conference here that DP and management information systems (MIS) departments too often behave as though their internal operations were of primary importance.

"Data processing is a tool that helps the company grow and prosper for the benefit of all our users and all our employees," he said in his conference address. What is important is what the company wants, "not what the 'knights of the DP Round Table' want," he added.

Wright said he was speaking from personal experience, explaining that at one time MCI was a case study in how not to establish an MIS organization.

Because the DP manager was interested only in his own operation, the department was not at all user-oriented, Wright said.

Summary Solution

"We ended up with a whole shelf of system manuals and little else" because system implementation "played second fiddle to system documentation." That problem was resolved, according to the MCI executive, by a summary — and somewhat ceremonial — dismissal of the entire information systems group, action that included a ritual disposal of all system documentation manuals.

Now, Wright said, MCI has a user-oriented MIS department dedicated to boosting the company's efficiency and helping it increase revenues.

When a new system is contemplated, a task force is established under the chairmanship of the primary user division. When the requirements are finalized, the chairman goes to the MIS group, but the task force continues to meet regularly while the system is designed and until it is finally turned over to the user, Wright said. "We keep our users, all of them, actively involved from the beginning," according to Wright, who said this has "resulted in considerable improvement in interdepartmental communications and in a much better product in the end."

Outlining his prescription for a successful MIS organization, Wright listed "flexibility, user orientation, open communications and an orientation to the business — these are of vital importance."

Flexibility is important, he said, because MCI has become successful by recognizing and seizing business opportunities that sometimes stretch the limits of the company, especially those of the MIS department. As an example, Wright noted that between March of 1980 and 1981, MCI built its residential customer base from 2,000 to 200,000. The sudden popularity of its residential services required a large increase in the DP operation's ability to process orders and perform billing functions, he noted.

User Orientation

User orientation is necessary, Wright said, if any system is to be successfully designed, developed and implemented. He remarked that for an MIS manager "there is probably no more satisfying feeling than to get the user to believe your approach was originally his or her idea."

Obviously, he said, communications is the key to success in this area because information resources management is really people management and requires feedback, communications and sympathy.

The MIS contingent must have a feel for what the company's goals are. "I expect our MIS people to keep in mind where we are going," he said.

Their job, he concluded, is to help MCI increase revenues. They must use their tools to help further the objectives of the company as a whole and not just those of their department, Wright concluded.

For Optimum Use of Systems

Hopper Stresses Importance of Data Integrity

By Marguerite Zientara
CW Staff

TYNGSBORO, Mass. — Information processing experts must start looking carefully at their data and evaluating it well to guarantee optimum usage of systems.

That was the message of Capt. Grace Murray Hopper, speaking at the Wang Institute of Graduate Studies here recently as part of the Warner & Swasey Distinguished Lecture Series.

Expressing concern about the "squeaky wheel" method of determining priorities of information, Hopper insisted that DPers must use the best processors for the best information. The value of information, she explained, can be determined by ascertaining how much time one has to act on data before obsolescence, the number of people affected by the action and the outright monetary value of the data.

Hopper stressed the importance of studying the possible costs of incorrect information, as well as of information that is maintained long beyond its useful life, and noted, "We have not looked at our data properly."

Where Knowledge Lies

Decrying the attitude behind the phrase, "But we've always done it that way," Hopper suggested, "We've got to keep educating our bosses. Presidents, vice-presidents, admirals and generals will have to learn to listen to their juniors because that's where the knowledge lies."

Citing General Accounting Office figures indicating the government has wasted an average of $450 million annually because of the lack of a standard, high-level software language, Hopper noted that the cost of not doing something can be higher than the cost of doing something.

Besides the need for accurate, timely information, Hopper cited the pressing need for more processing speed than is currently available. The Univac I computer, developed in 1951, was 1,000 times faster than the Mark I developed in 1944, Hopper noted. And the CDC 6400 developed in 1964 was 1,000 times faster than the Univac I.

With such serious world problems as rising populations in areas of inadequate food supplies, we need "right now" a computer that is 1,000 times faster than the CDC 6400 for crop-related weather forecasting, "and we haven't got it," Hopper said.

The satellite photographs available in recent years, when computer-enhanced, can tell observers the temperature of the water 20 feet below the surface, for example, but such data results from 10^{15} arithmetic computations, she explained.

Such accurate and potentially useful projections now take three days, by which time they are no longer worthwhile for weather forecasting.

A glimmer of hope lies in the National Aeronautics and Space Administration's newly developed Massively Parallel Processor (MPP), whose operating mesh consists of 128 by 128 microcomputers, adding up to 16,384 computers on a single system, Hopper said.

Calling the MPP "one of the most beautiful things I've ever seen," Hopper said, "We need that power."

Video Series Gives Basics Of Computers

LINCOLN, Neb. — A computer education series on video cassettes designed to provide basic knowledge in all aspects of computers in business is being distributed here by GPN.

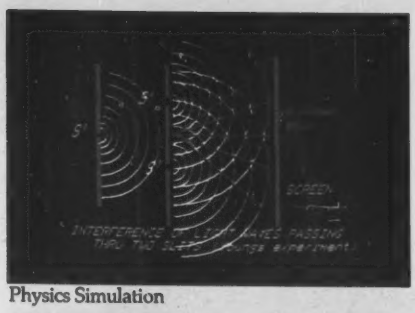
"Business Computing ... Cut Down to Size" contains five video cassette lessons that run from 15 to 27 minutes. The series offers introductory instruction to college-level and postsecondary students of business administration, according to the vendor.

It was produced in 1980 by Evolution 1, a division of Electronic Data Systems Corp. of Dallas, Texas, and includes examples and applications that illustrate computer capabilities in a business setting.

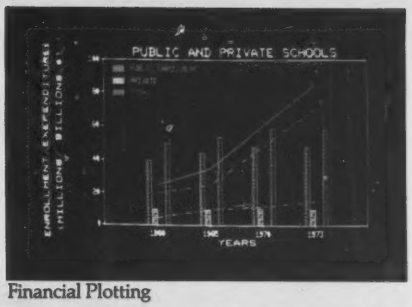
Each lesson sells for $375, but educational discount rates apply if all lessons of the series are purchased. A text booklet for the series is priced at $3, the vendor said.

Business Computing is available for nonbroadcast use only, but broadcasters may acquire duplication rights for agencies or institutions in their areas.

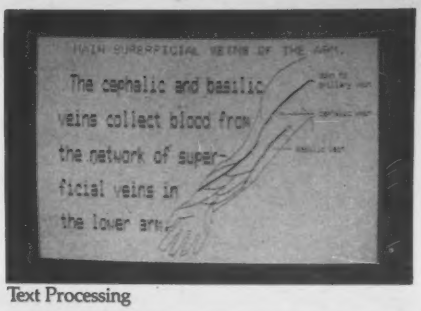
A video cassette preview kit of "Business Computing" may be reserved by contacting GPN at Box 80669, Lincoln, Neb. 68501.



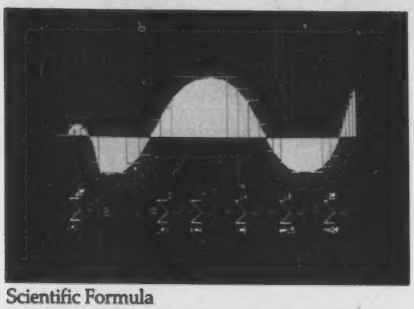
Physics Simulation



Financial Plotting

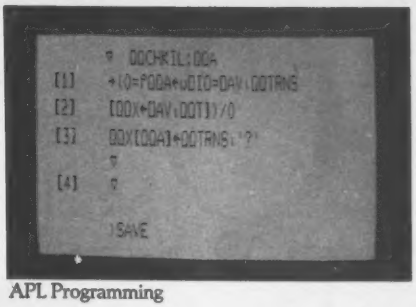


Text Processing

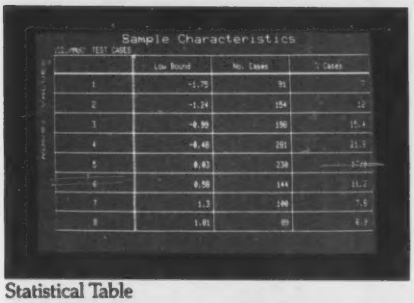


Scientific Formula

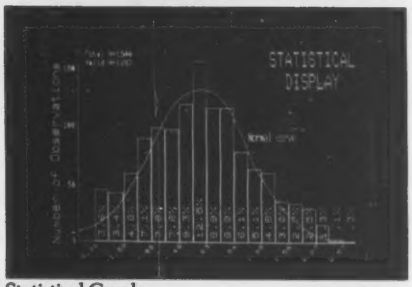
Special Needs Education



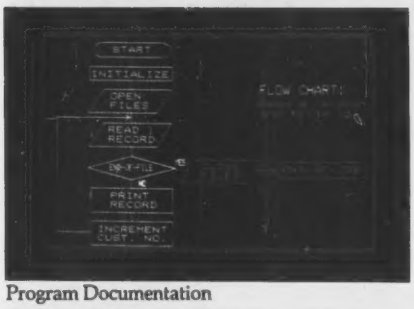
APL Programming



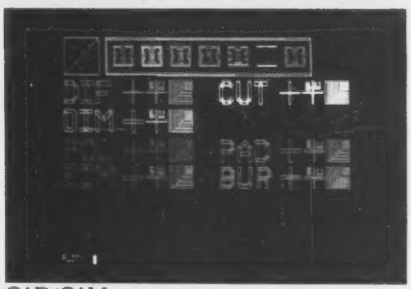
Statistical Table



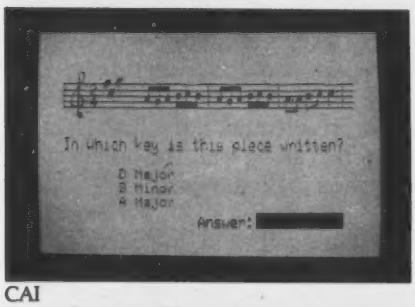
Statistical Graph



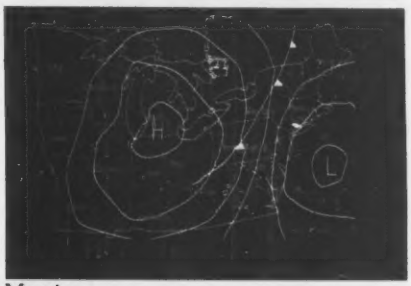
Program Documentation



CAD/CAM

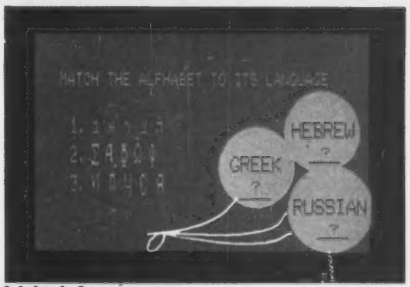


CAI



Mapping

Data Entry



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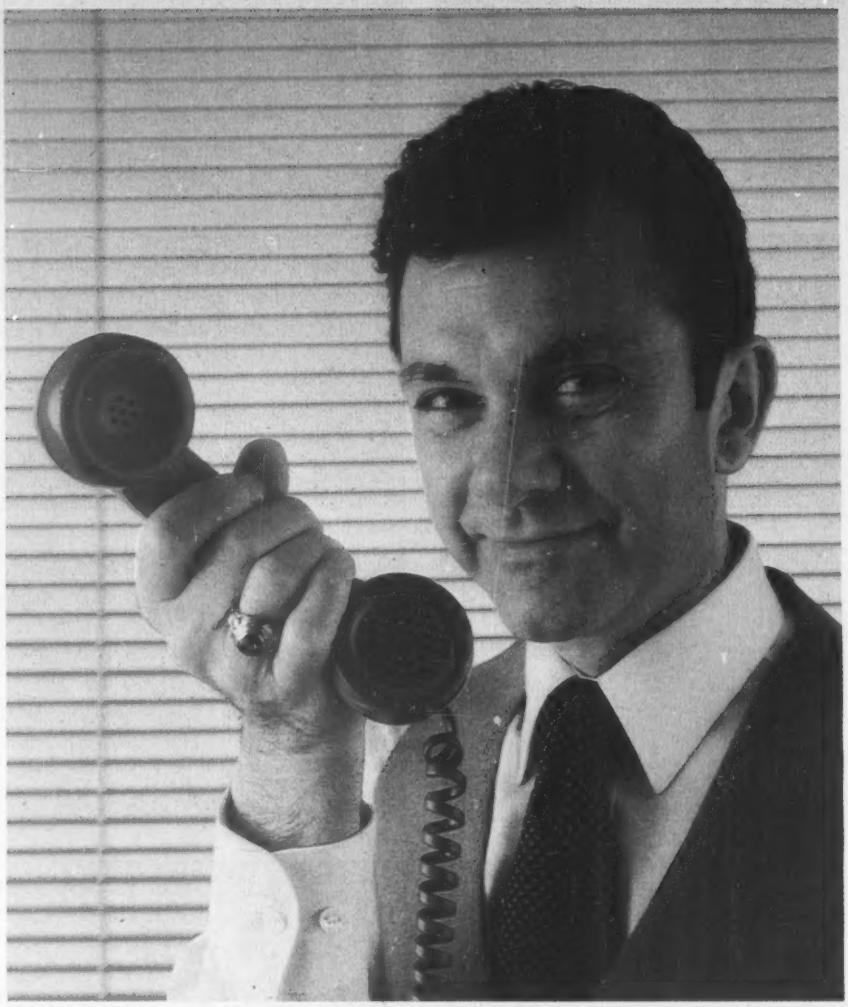
Sy Kraut
Vice President & General Manager
Honeywell Field Engineering



Some day computers may be monitored remotely by other computers and repaired by robots. But until that day arrives, people will continue to be the most important element of service. Information, tools, and spare parts make up the rest of the equation, but it requires experts to apply them, also.

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Aid Sought From Vendors, DP Groups

Hearing Set on Patent Office Automation

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Under a congressional mandate to develop a full automation plan, the Patent and Trademark Office (PTO) has scheduled a July 23 public hearing on its automation needs and is actively seeking the aid of DP vendors and associations.

Although PTO operations do include a computerized workflow tracking system, most of the agency's operations are still manual. Neither PTO officials nor those who come in contact with the agency are unaware of the problems this lack of automation causes.

Nor are the problems minor, the PTO concedes. The agency has almost 35 million U.S. and foreign patent files, divided into 108,000 subclasses. According to a PTO official, "presently all of our research, retrieval, refiling and use of these references to determine whether someone is entitled to a patent is done manually and with all of the clerical burdens that entails."

Complicating the situation, some 150,000 new patent and trademark applications come in every year. And a recent survey of several rapidly advancing technology subclasses found as many as one in four files are missing, either because they are being used or have been misfiled, misplaced or stolen.

Increasing Complaints

Increasing complaints about the situation led to legislation, passed by Congress last year, that calls for the PTO to develop by December 1982 a plan for developing computerized data and retrieval systems for "all aspects of the operation" of the office, particularly the patent search file, patent classification system and trademark search file. The legislation said the plan should be prepared with no regard for the possible cost of this automation.

To date, PTO has formed an interagency steering committee that has put together an outline of what the final report should contain and identified five areas for agency automation:

- A system for searching patent prior art to decide if a patent application should be approved.
- A similar system for trademark applications.
- Internal operations automation to keep track of the agency workflow. The office receives approximately 32,000 pieces of mail daily.
- Systems for communicating with the public, to make available, for example, to libraries and other PTO "constituents" the storehouse of technology contained in the PTO files and search room facilities.
- Greater use of computerized printing, including incentives and procedures for patent law firms and large corporations to submit lengthy patent applications in machine-readable form.

According to PTO Commisssioner Designate Gerald J. Mossinghoff, the agency needs public assistance "to state our long-term goals — what we are really trying to do and why, identify state-of-the-art approaches that might be available to achieving those goals, identify areas where you may need technological breakthroughs to achieve those goals and, finally, end with a coherent automation plan to move toward full automation of the Patent and Trademark Office."

Because his selection to be PTO head has not been confirmed by the Senate, Mossinghoff said he is not the official spokesman for the agency's automation effort.

But as a patent law expert (and a former patent examiner), he suggested "it's not an issue of whether we become an automated Patent and Trademark Office; the real issues only center around the time, the cost benefits and the type of technology that's selected."

He said he is hoping the information supplied at the July hearing will help PTO develop a "rough" idea of what the needed technologies might be and how much they might cost.

Technology Requirements

For instance, he said he is familiar with the Lexis legal data base and thinks PTO might move to the type of mass storage used for that service. But, he continued, "we now have a gigantic data base that is orders of magnitude larger than some of the things that have already been put into computers." The PTO data base might therefore require technology that is not yet perfected, he said.

The agency is now contacting people who might be interested in helping in the effort, ranging from groups representing inventors and small businesses to legal associations. A number of equipment vendors and DP user and scientific associations and groups will also be contacted.

Those interested in testifying can obtain more information from Bradford R. Huther, acting assistant commissioner for finance and planning. His address is Commissioner of Patents and Trademarks, Washington, D.C. 20231.

Calendar

July 13-14, Los Angeles — **SAS Two-Day Basics Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511. Also being held July 29-30 in Arlington, Va.

July 16-17, New York — **SAS Two-Day Advanced Input/Output Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

July 20-22, New York — **SAS Three-Day Regression & Anova Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

July 20-24, Annapolis, Md. — **Personnel Productivity in Data Processing.** Contact: Bob Keston, Keston Associates, 11317 Old Club Road, Rockville, Md. 20852.

July 21-22, Denver — **Distributed Data Processing.** Contact: Performance Development Corp., 1101 State Road, Bldg. N, Princeton, N.J. 08540.

July 23-24, Atlanta — **Systems Project Management.** Contact: Registrar, Arthur Andersen & Co., Center for Professional Education, 1405 N. Fifth Ave., St. Charles, Ill. 60174.

July 23-24, Denver — **Data Administration and Data Dictionary.** Contact: Performance Development Corp., 1101 State Road, Bldg. N, Princeton, N.J. 08540.

July 23-24, New York — **Advanced Techniques for Auditing IMS.** Contact: MIS Associates, 12 Juniper Lane, Framingham, Mass. 01701.

July 23-24, Detroit — **Managing Documentation & Documentation Standards.** Contact: Carnegie Press Center for Documentation Resources, 100 Kings Road, Madison, N.J. 07940.

July 27-31, Lausanne, Switzerland — **Third World Conference on Computers in Education 81.** Contact: WCCE 81 — Press and Information Office, Claude Comina, EPFL-Centre Midi, CH-1015 Lausanne.

July 27-31, Annapolis, Md. — **Long-Range DP Plan Review and Evaluation.** Contact: Bob Keston, Keston Associates, 11317 Old Club Road, Rockville, Md. 20852.

July 27-31, Raleigh, N.C. — **VM/370 Class.** Contact: National Advanced Systems, 1155 Kildaire Farm Road, Cary, N.C. 27511.

July 27-31, Denver — **Structured Maintenance.** Contact: Karl Dakin, Director of Marketing, Edulectures, Inc., Suite 102, 6777 Wadsworth Blvd., Arvada, Colo. 80003.

July 29-31, Andover, Mass. — **Business Applications for Computer Graphics.** Contact: Richard D. Murray, Director of Conferences, Institute for Graphic Communication, Inc., 375 Commonwealth Ave., Boston, Mass. 02115.

July 30-31, Boston — **Managing Documentation and Documentation Standards.** Contact: Carnegie Press Center for Documentation Resources, 100 Kings Road, Madison, N.J. 07940.

July 30-31, Boston — **Software Acquisition Management.** Contact: Education Foundation-Data Processing Management Association Seminars Department SAM, Suite 1016, 5959 W. Century Blvd., P.O. Box 91295, Los Angeles, Calif. 90009.

Call for Papers

WORLD FUTURE SOCIETY'S COMMUNICATIONS AND THE FUTURE, Sheraton Washington Hotel, Washington, D.C., July 18-22, 1982.

The World Future Society seeks papers for consideration on the future of telecommunications, computers, broadcasting, film, newspapers, libraries, magazines and advertising.

Abstracts and questions should be directed to the 1982 Assembly Committee, World Future Society, 4916 St. Elmo Ave., Washington, D.C. 20014.

Group Awards Micro Systems

CUPERTINO, Calif. — Microcomputer-based systems valued at nearly $130,000 have been awarded to 22 educational groups by the Foundation for the Advancement of Computer-Aided Education, Gregory Smith, the foundation's chairman, announced.

The foundation, originally chartered the Apple Education Foundation, is a nonprofit corporation established to support and develop new methods of learning through the innovative use of small computers, a spokesman said.

Most of the systems provided under the grants include Apple II personal computers, manufactured here by Apple Computer, Inc.

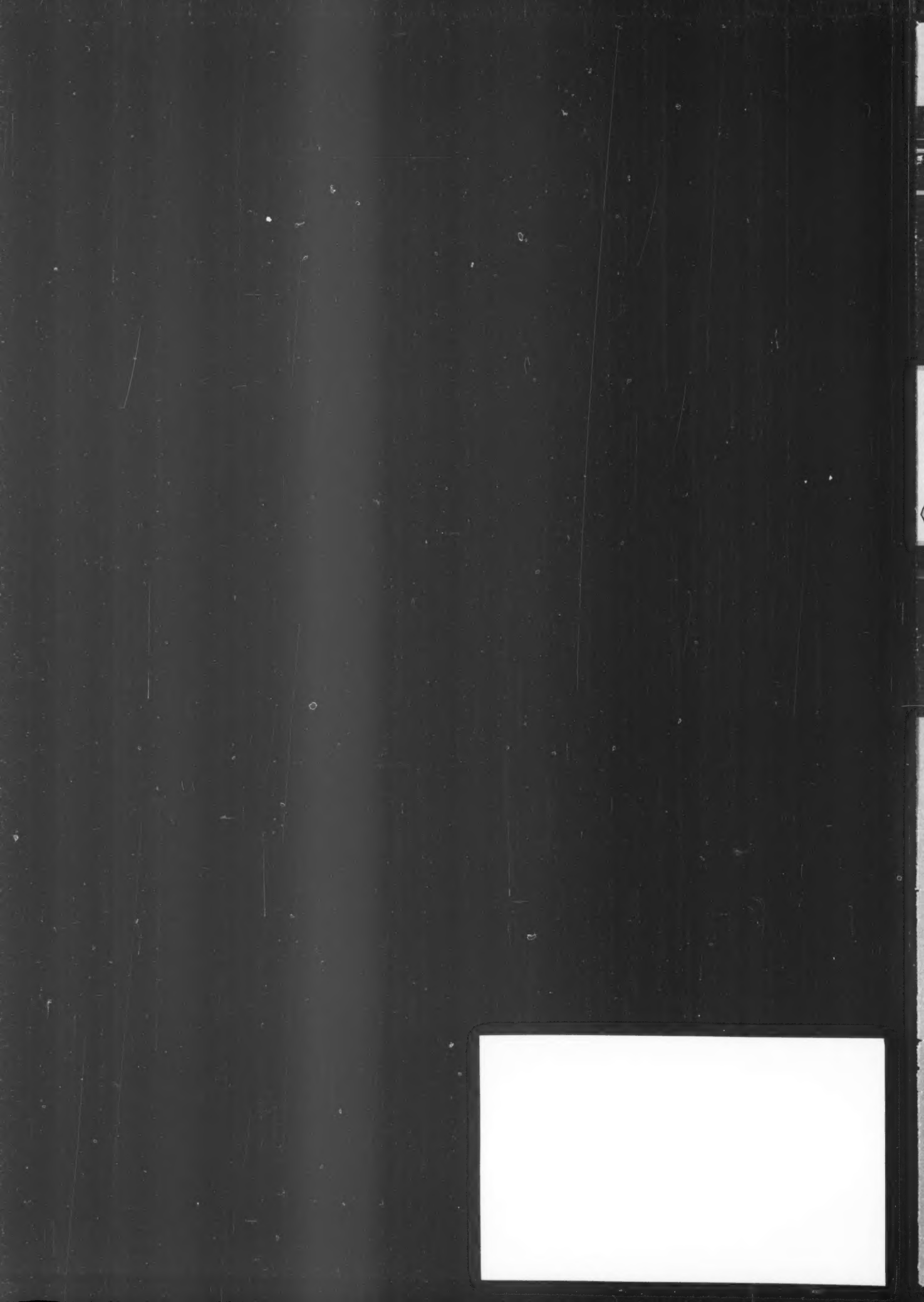
Major Contributors

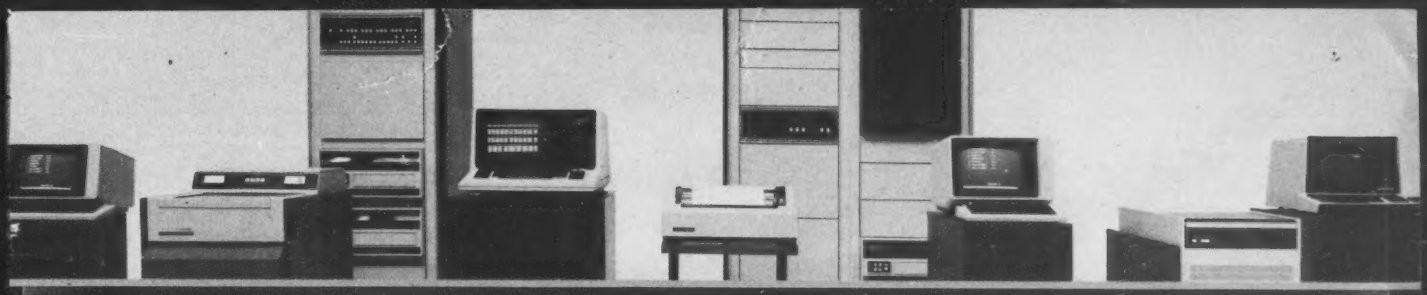
Other major contributors have been Advanced Business Technology, Inc., ABW Corp., Heuristics, Inc., Integral Data System, Inc., Interactive Structures, Inc., M&R Enterprises, Inc., Mountain Computer, Inc., Personal Software, Inc., Regis McKenna Public Relations, Stoneware Microcomputer Products, Inc., Software Publishing Corp. and Videx Corp.

This is the fifth set of grants made by the foundation since its founding in October 1979 and brings the total value of grants given to educational institutions and individuals to approximately $625,000, the spokesman said.

The Foundation for the Advancement of Computer-Aided Education is headquartered at 20863 Stevens Creek Blvd., Cupertino, Calif. 95014.

PAGES 33-34 MISSING READER SERVICE CARD



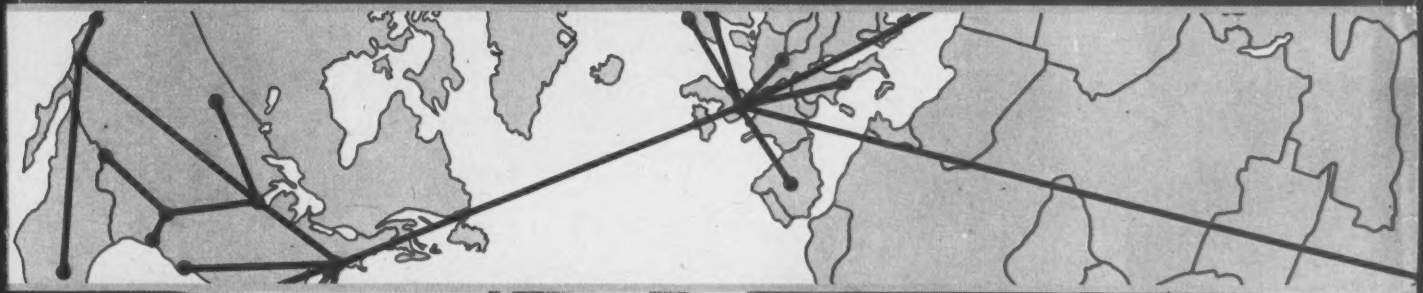


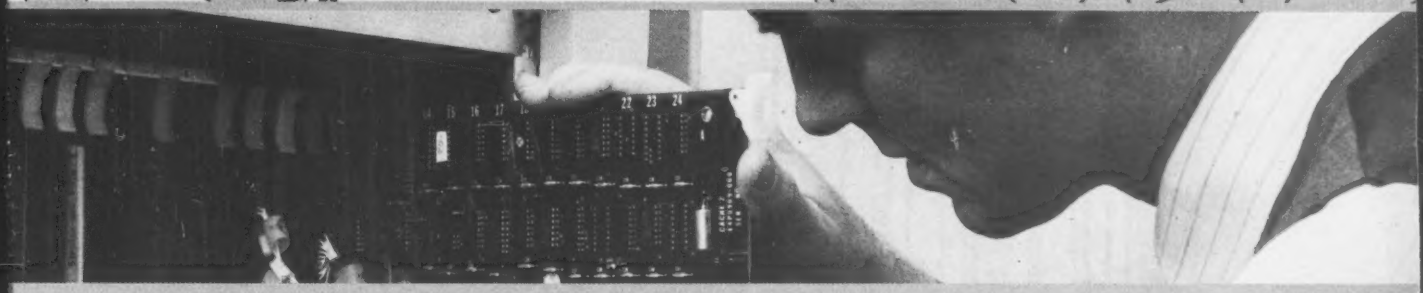
PROGRAMMING LANGUAGES:

COBOL
FORTRAN
RPG II
ASSEMBLER
MICRO ASSEMBLER

APPLICATION SOFTWARE:

HOTEL MANAGEMENT
MANUFACTURING MANAGEMENT
RETAIL INVENTORY CONTROL
DISTRIBUTION AND WAREHOUSING





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EDITORIAL

Close Call

It may be true that nothing illustrates modern society's dependence on the computer quite like a strike by computer operators. In many cases, after all, we may not realize how valuable something is until it is taken away.

Air traffic controllers are computer operators and last week they came close to striking in this country [CW, June 22]. That would have resulted in severely limited air travel and moved many to appreciate how crucial the computer-based support rendered by air traffic controllers is to "business as usual."

Contemporary airports need computers to monitor the movement of aircraft, estimate arrival times and to allocate runways, passenger gates and other resources. Air traffic controllers could not perform their vital functions at large airports without computer support.

The U.S. has yet to experience a major strike by computer operators, but other nations — the UK, for example — have weathered such storms. When DPers among other civil servants stopped work in the British government, needy people failed to receive welfare payments. A recent strike by DP workers disrupted the UK's participation with allies in a large military training exercise.

A strike by air traffic controllers might have launched a series of strikes by U.S. computer specialists, since organized labor has begun efforts to incorporate programmers within their ranks. Some observers predict steadily increasing incentives for programmers to unionize.

They base this view on the observation that new methods of programming allow the bulk of a software development team to be less skilled than before. This trend, in conjunction with the economics of maintaining an adequate programming staff, is seen as leading employers to establish software development along the lines of conventional factory production.

According to this view, programmers will be likely to unionize as their environment comes to resemble a conventional factory. Employers and the general population will then face the prospect of strikes by programmers, since striking is the standard last resort of any unionized group of workers.

Air traffic controllers have a right to strike, despite arguments to the contrary by the Federal Aviation Administration. But obviously, such a strike would have greatly upset a lot of people.

Had it happened, we would have had a chance to learn much about how to manage life in a highly industrialized nation when computer support for a socially critical function is temporarily curtailed.

DATA PAST

Five Years Ago
June 28, 1976

ATLANTA — In response to user demand for increased on-line and remote processing capabilities, IBM last week introduced its top-of-the-line 3/15, Model 15D and nine lower cost System 32 models.

The System 32 models were also designed for entry-level small business applications.

— — —

DENVER — Fifty-six insurance companies were indicted here for illegally obtaining individuals' confidential medical records, some of them computerized. The indictments, charging conspiracy, impersonation and theft of trade secrets, were handed down by a grand jury following an eight-month investigation. "Taking medical records without authorization has been going on for at least 25 years," District Attorney Dale Tooley said.

Ten Years Ago
June 30, 1971

WASHINGTON, D.C. — Ralph Nader called on the computer community to use its technology to help the consumer movement. Nader admitted that the application of computers to consumer information systems is a relatively unexplored field.

LETTERS

LPI Distributor for TSI

In your May 25 issue you carried an article ["Four-Man Firm Making Mark With Compilers,"] on Language Processors, Inc. (LPI). This article gives the impression that LPI developed PL/I, upon which all the languages are based, and Fortran.

These products, as well as the proprietary technology upon which all these languages are based, were developed by Translation Systems, Inc. (TSI), a wholly owned subsidiary of Systems and Informatics, Inc. LPI has licensed this technology and is a distributor for TSI products in the U.S. Systems and Informatics markets TSI and LPI products in Europe under the registered trademark Polyglot.

LPI has done a good job in adding new languages to this basic technology and we will continue supporting LPI in promoting these excellent products.

Tom Linden
President
Systems and Informatics, Inc.
Brookline, Mass.

AMA-Aicpa Alliance?

In reference to the article on the systems evaluation gap in the health care industry [CW, May 18], it seems that those panelists at the National Computer Conference have overlooked an obvious source of computer system evaluation: their auditors.

Health care facilities are audited by certified public accounting (CPA) firms, and those CPA firms that are large enough to have an auditing staff that specializes in the health care industry usually have a staff of management advisory services personnel who are capable of performing evaluation of health care information systems.

However, a few of these CPA firms, especially the largest ones, also offer software packages specifically designed for the health care industry, which, obviously, may not produce the desired "unbiased" opinion. At the same time, CPA firms adhere to a well-defined code of ethics that would prevent them from performing an evaluation when there exists any such conflict of interest.

So, if the health care facility desires an unbiased opinion and its auditors do not offer software packages that would cause a conflict in the evaluation, then it has access to unbiased evaluations. And who better understands the health care facility's needs than its auditors? If the industry is at a loss as to which way to turn, then maybe the American Medical Association (AMA) should form an alliance with the American Institute of Certified Public Acccountants (Aicpa).

Jim White
Senior Consultant
Mayzima & Co.
Daytona Beach, Fla.

Israel's Timing of Raid

I must take exception to the implications of an article entitled "French DPers Escape Attack on Iraqi Reactor" [CW, June 15].

The article implied that 150 technicians narrowly escaped death because of Israel's disregard of their work schedule.

In truth, Israel timed the raid on the Iraqi reactor for late on a Sunday afternoon expressly for the purpose of minimizing casualties.

As was revealed, only one technician died in the raid, since all of the other technicians had already left for the day.

Israel's high regard for human life remains one of its prime considerations. Any implication to the contrary is less than forthright.

Jeffrey S. Friedman
Systems Analyst
Union Dime Savings Bank
New York, N.Y.

SOFTLINE/Werner L. Frank

Software Productivity: A Different View

Recent columns of this series have dwelt on productivity problems and issues concerning software production. In that connection, we have discussed popular views and approaches that attempt to alleviate these difficulties and have cited a variety of aids and methodologies that have been proposed to be of assistance in improving the construction and operation of software.

Now we take note of one proponent, Ed Lee of Pro-Log Corp., who stands apart and questions the panacea for "development systems."

In a number of articles, Lee has taken issue with generally accepted views and has stated that the electronics industry today has a sufficient number of personnel to design production software and, in fact, to perform software tasks without a development system or a higher level language.

Such a claim immediately aroused my interest, and I readily replied to Lee's public offer to provide more information and background.

Lee has contended that development systems are the base of today's programming efforts and that these systems seem to be right for implementors only because we are told they are right. Furthermore, since development systems became available before correct software design methods had evolved, they have stifled better methods and have, in fact, given us the problems we now face in producing software.

In connection with these views, Lee also has attacked the notion of the high-level language as a bad partner of development systems in furthering software design. In this context, the current interest in Pascal and Forth is seen as a fad.

Focus on Engineers

Lee's focus is on the professional electronics engineer rather than on the hobbyist or applications programmer. He makes this distinction because he believes the aim of the latter two implementors is to achieve a single system that works for the least cost and in the shortest time.

In contrast, the aim of the engineer is to produce a software design to be manufactured for many users. Therefore, the product of the professional engineer is to be viewed differently. The engineer must document the software solution for manufacturing and field service in order for these entities to produce the product and then maintain it.

This documentation must be of sufficient quality and detail that less-skilled personnel can comprehend it and produce end products.

And there lies the crux of the difference in viewpoints. The conventional approach to software shared by most of us is the step-by-step process of design, development and maintenance, which requires interpretation and individual expression. As aids, we use development systems and higher order languages.

Lee, on the other hand, advocates a standardized documentation system which, when utilized by the design engineer, will produce a tested and debugged software design ready for delivery to the manufacturing division.

This process is called STD Modular Methods, where STD could mean any of the following: simple to debug, simple to develop or swift to deliver.

Lee views computing from the confines of the microprocessor field and divides the world between "computer culture" and "engineering culture." He believes computer culture has a limited perspective and that its approaches are dictated by dependency upon the computer. This attitude is highlighted by the practitioners who "forget how the hardware actually works and are taught to speak to a powerful black box."

'Lee has contended that development systems are the base of today's programming efforts and that these systems seem to be right for implementors only because we are told they are right. Furthermore, since development systems became available before correct software design methods had evolved, they have stifled better methods and have, in fact, given us the problems we now face in producing software.'

Engineering Culture

In contrast, the engineering culture is production-oriented and in control of problem solving by direct and uninhibited understanding of how the computer works, according to Lee.

The STD Modular Methods for program design and documentation derives from adapting the hardware module design approach for use with software by observing the following steps:

1. Break the problem down into component modules.
2. Flow chart each module using standard presentations.
3. Write a specification for each module.
4. Design the program using a precise form with standard notation.

The last step involves describing the module's function through a series of steps that are, in essence, a mnemonic code consisting of three parts: labels, instruction and modifier. Indeed, we have arrived at the threshold of an assembler, with the redeeming value in this case of a proposed instruction set having universal application.

To complete the process, the engineer must do a dictionary lookup of the instructions for a particular object CPU and hard code and appropriate machine language in hexadecimal. Upon completion of this translation, the resulting code can be inserted into a programmable read-only memory programmer and unit testing can begin.

Lee advises that the weakness surrounding DP culture is the almost unheard-of practice of writing program module specifications (Step 3 above). He also feels that computer-aided design tools generally get in the way of good designers. In addition, assemblers lead to bad practices that cause the user to forget the machine code nomenclature and create unstructured program results. Furthermore, higher languages intrude on the intimacy of being able to converse directly with the computer. They lengthen the program and the execution time of a task.

Lee has challenged the semiconductor industry by his fundamentalist views on program design and his denigration of development systems for microprocessors. He has obliquely included in his challenge the application programmer as well.

Perhaps coding in hexadecimal still has a small place in developing minimal storage and high-performing control programs ultimately destined for residence in read-only memory. However, beyond that point, it is hard to see how automated aids and development systems can deter and limit productivity and the effectiveness of engineers or programmers.

HUMAN CONNECTION/Jack Stone

Have Productivity Aids Worked?

True or false? The productivity of systems development personnel has vastly increased over the years, primarily because of the availability of a vast array of computer-based "productivity aids" — on-line interactive compilers, data base management systems, program generators, data dictionaries and so on. My guess is that nearly all of the readers would answer "true," but here's one who responded with a resounding "false" to the question. He's Kenneth Blythe, a senior DP manager of a major federal government agency, and here is what he thinks:

How are we doing in DPer productivity?

It is not fully appreciated by many DP managers, but productivity in systems development departments today is typically quite low, when measured against the capabilities of the people.

Of course, machine aids have helped the development process over the years, perhaps 10% to 20%, but, relative to the potential for improvement, this gain is practically negligible. We're simply not performing on the job that much better.

Here's the real story underlying DP productivity: Many people in the field have read about projects or had direct project experience where a few analysts or programmers turned out the work at levels which far, far exceeded the output of the average DPer — sometimes 10 to 20 times greater — even though all members of the project had access to the same set of analytical and programming aids. The reason? Those few people were properly trained and, more importantly, motivated to produce — and they had the skills, management support and the work environment to do so.

Just how can DP managers motivate their staffs?

Without intending to be facetious, the answer is "Not without great difficulty." I should remind you that the factors involved in motivation have been well-established by industrial psychologists, and they include among others: job challenge, learning opportunities and contribution to the organization and to society. However, the problem is that the implementation of such a program in the context of the DP department represents a very substantial investment in time, money and manpower — far greater than almost any senior management is willing to commit. In other words, the "front office" interest is focused on short-term financial gains rather than long-term operational improvements.

Are you restricting your comments just to DP or does this attitude reach over into other areas of business and government?

Sad to say, the attitude is pervasive throughout American industry. In fact, this short-sightedness is one of the major reasons why American products and services — automobiles, steel and electronics, to name a few — currently fare poorly on world markets. Management focus on short-term results, we are told, comes from the elevation of people with financial or legal backgrounds into executive positions. These people, by virtue of their experience, are oriented toward low-risk solutions to business problems and instant return on investment. Their management approach is to seek change — that is to say, improvements — in their business by reallocation procedures, like reorganization or redistribution of assets.

This approach, though it can produce gains over the short-haul, does not develop basic, structural changes that may be necessary for success in the long-haul, such as the development of new product lines, manufacturing processes or, in the case of the DP department, major changes in DPer productivity. Until we can convince our top executives to make the long-term investment necessary to motivate our systems people, we will not be able to achieve our productivity potential.

LETTERS

Equal Time for Men

The Compuware ad [CW, May 25] is sexist and unfair to your women subscribers. In order to please us and improve your paper, would you discontinue such advertising copy?

Or give equal time to some ad with bare-chested and/or leggy men!

Mary M. Smith
Doraville, Ga.

Winners and Losers

I wish to express concern about your reporting of the recent series of computer ratings of mainframes, minicomputers, microcomputers, and terminals. My concern is that your identificaton and discussion of "winners" and "losers" fails to take into account the number of systems represented in the ratings.

For example, I recall that in your rating of large mainframes [CW, May 4], you valued the Magnuson Systems Corp. system as having received the highest overall satisfaction rating. Although technically true, Magnuson was represented by only four systems, a very low number to support a claim as "the best."

I noticed the same problem with the minicomputer ratings and in the ratings of personal computers [CW, May 11], in which Intertec Data Systems Corp. was reported as the "loser." Although numerically correct, this was based on only seven systems that were identified as "all models."

In the issue of June 1, 1981, you reported ratings for CRT terminals and teleprinters, with winners and losers, but no indication of the number of units represented in each of the tables, although I did note that for selected manufacturers you did specify the numbers of users and units.

I recognize that you were reporting information that was furnished by the organizations that conducted the surveys, but I believe that, in fairness to the manufacturers and the readers, you should take more note of the numbers of units involved in each rating.

In computers, as in automobiles and other things built by man, there is some variability in quality, and there may be regional differences in customer support. Furthermore, especially when it comes to computers, the fit between the hardware, software and user is a major determiner of user satisfaction.

Thus, a survey of any kind must depend upon an adequate number and sample of whatever is surveyed in order to be sufficiently representative of the units installed. I believe that four units, and even seven units, are not adequate sample sizes to support any definitive statements, much less headlines, concerning best and worst.

In fairness to the manufacturers and to the readers of the articles, who may only look at the satisfaction rating and who may not recognize that such small numbers are involved, I recommend that in reporting information of this type you clearly specify the proportion of the systems in use that is represented by the sample to be discussed or make it perfectly clear that the observations are based on a very small sample and may not be generalizable to all machines by that manufacturer.

Such qualifications may reduce the impact of the articles, but I believe these qualifications are an important ethical responsibility of a major publication such as yours.

David P. Yens
Assistant Dean
For Academic Affairs
Mount Sinai Medical Center
New York, N.Y.

I suspect, however, his "reward" will be in the form of a letter of commendation from some official.

William A. Delaney
President
Analysis & Computer Systems, Inc.
Bedford, Mass.

Survey Problems

I would like to address what I feel are several glaring problems in both Datapro Research Corp.'s survey methodology and follow-up reporting of Datapro's annual user survey results [CW, May 11].

First, to the survey itself. I find it difficult to believe that a reputable research organization can claim any significance in data obtained from as few as two survey respondents (Basic/Four Corp. — other models) in a user population that, in most cases, numbers in the thousands. Basic statistics aside, common sense would indicate that such data would bear little resemblance to real world conditions.

Specifically, during the past 14 years, we have shipped and installed over 40,000 computer systems to both OEM and end-user customers. Measuring our level of user satisfaction based on interviews of six users with 11 installations seems somewhat absurd.

I would suggest that any future survey should attempt to at least obtain some semblance of statistical validity, perhaps by obtaining customer lists or other support from vendors rather than relying on simply your circulation and Datapro's mailing lists. Perhaps then it would be more justifiable to present the resulting information on more than 10 pages of valuable editorial space in your esteemed publication.

Your article itself not only demonstrated a total lack of understanding of products, companies and the way business is conducted in the computer industry, but also contained at least one glaring error from our standpoint.

Your article claimed, "The computer systems most likely not to be recommended to other users were those from Computer Automation, Inc." and the following analysis pointed out that two in six (33%) would not serve as good references.

Unfortunately, seven paragraphs earlier the article analyzed General Automation users' reference tendencies, pointing out that nine in 12 (75%) respondents would not recommend their system. I'll leave further mathematical analysis to you.

We must also point out that the final quotation, "Also, three of the six CA system users in the survey claimed that the vendor did not provide all the promised software or support," certainly demonstrates a lack of understanding of our company and the business we are in.

Computer Automation has sold about 1,000 systems worldwide (about 3% of our installed base) to end users. These sales were made by our Commercial Systems and Industrial Products Divisions and generally involved some degree of customization — either hardware, software or perhaps both. These installations generally re-

(Continued on Page 40)

Reward for Honesty?

Computerworld's article concerning the honest student who reported an overpayment of $800,000 [CW, June 1] is heartening to read. It's good to know there are honest people in the land.

Since he had many alternatives open to him at the time, and the article reported that the error may not have been caught for some time, if ever, he surely deserves a reward.

Normally, when anything of value is lost and returned, a 10% fee is considered about right. Since the state of Utah, in effect, "lost or misplaced" $800,000 and the student returned it, how about a 10% or even a paltry 5% finder's fee? Honesty and integrity should be rewarded whenever and wherever it is found.

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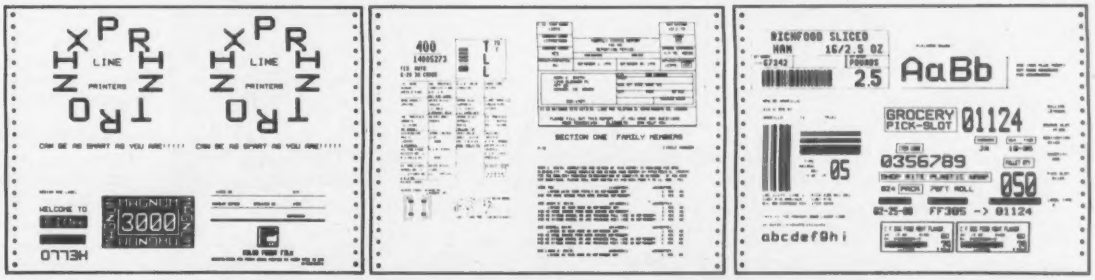
System Configuration

The Magnum 780F can be used as a stand alone system or can be connected via communication lines to a larger central processor either local or remote.

As a stand alone system, the Magnum 780F can be used to create labels via the keyboard. The user can store the labels on disk for future access or can send them directly to the printer for immediate printing. A label format (stored on disk) and variable data, entered either via the keyboard or from data files, can be merged together to create continuous labels each containing variable information.

As a remote label processor, the system can receive data from a host computer via communication lines and merge that data with label formats previously stored on disk to create labels where they are needed. The host computer may be utilized for other functions while communications is in process.

The Magnum 780F provides the user with several programming languages including Databus*, Fortran and Basic. These enable the user to create custom programs not only to meet printing needs but also for data processing and accounting functions.



Consult your local member of the Printronix Distributor Group

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LETTERS

(Continued from Page 38)

quire customer acceptance or approval on contract completion. Therefore, we believe the likelihood that the three disgruntled users in your survey purchased their systems in such a manner is extremely remote at best.

The remaining 97% of our installed base was sold through OEM customers — vendors who buy our hardware and perhaps operating system software and resell to end users in specific market areas. Each OEM typically adds value to our products, usually in the form of applications software.

In such cases, all software (promised or otherwise) and support is generally supplied to the end user by the OEM, and we have little control over the ultimate user's satisfaction. The same argument can be made by any number of other vendors in the survey that sell to OEMs, including Data General [Corp.], Digital Equipment [Corp.] and perhaps even IBM for their Series/1 product line. This perspective, of course, was not considered in your article.

We believe that surveys of this type, properly conducted and statistically meaningful, would be of great benefit to the computer industry, and a fair journalistic analysis of these surveys in your magazine would be of great value to your readers. However, the Datapro survey as it presently is conducted and your incongruent analysis of it leaves much to be desired.

Richard Comstock
Manager
Product Marketing
Commercial Systems Division
Computer Automation, Inc.
Irvine, Calif.

Series/1 System

Readers should not be mislead by Hillel Segal's serious oversight in his review of IBM's Series/1 [CW, June 15].

Segal should have reviewed the most advanced system available from IBM for the Series/1, which requires 20 minutes to install (no system generation) and has every known application productivity aid such as virtual memory, more complete control structures than PL/I, indexed files, unlimited length variable names, no limitation on program size and up to 18 users with full security.

This is the Waterloo Virtual Basic and the entire system costs about half as much as the EDX approach.

We use Waterloo Virtual Basic and recommend it as a first-rate productivity tool.

James H. Cowden
Sierra Systems
Austin, Texas

Language of Choice

Referring to the article "IBM Series/1 Test Snags Preclude Comparisons" [CW, June 15], in several past issues *Computerworld* readers have already read the EDX Cobol has many usability problems, particularly in a multiprogramming environment.

Rather than reread about EDX's failure to support a commercial environment, it would be more informative if the benchmarks compared RPS Cobol or CPS Virtual Cobol, which might have performed an accurate job.

While I completely agree that EDL is the language of choice under EDX, I feel a better comparison would involve the language of choice of most programming shops — Cobol.

Henry Traendly
President
Manchester Systems Group, New York, N.Y.

Computerworld welcomes comments from its readers. Preference will be given to typed, double-spaced letters of 150 words or less. Letters should be addressed to Editor, *Computerworld*, Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

There are 6 key factors for success in database systems. One of them is ...

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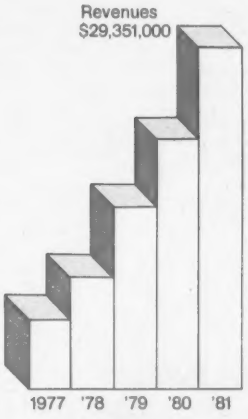
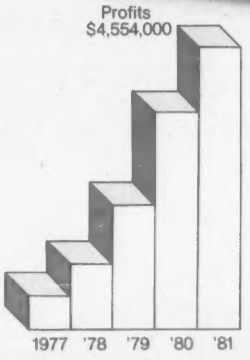
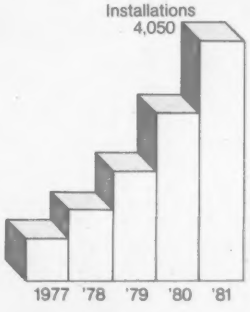
- ☐ FIRST distributed data processing DBMS. 1979
- ☐ FIRST IMS-DL/I ESCAPE Facility. 1980
- ☐ FIRST Audit Information Management System. 1980
- ☐ FIRST DBMS to meet the 6 key factors for success in database systems. 1980
- ☐ FIRST DBMS to be on Datapro Honor Roll 4 years in a row.
- ☐ FIRST in profits, growth, and financial reserves of all independent database software companies.







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8	Minneapolis, MN	17	Dearborn, MI	1	Calgary, ABT
8	Norfolk, VA	17	Houston, TX	1	Des Moines, IA
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8	Winnipeg, MAN	17	Washington, DC	6	Albuquerque, NM
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16	Boston, MA	24	Toronto, ONT	7	Syracuse, NY
				7	Tampa, FL
				7	Toledo, OH
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				20	San Antonio, TX
				20	San Juan, PR
				21	Sioux City, IA
				22	Dayton, OH
				22	Meadowlands, NJ
				22	Knoxville, TN
				22	Manchester, NH
				22	New York, NY
				22	Providence, RI
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Random Notes

Cobol Subroutine Processes, Standardizes Date Calculations

BUFFALO, N.Y. — A Cobol subroutine to process and standardize date validation and date calculation, which reportedly runs on any computer that supports Ansi Cobol, including IBM and plug-compatible equipment, is available here from Thomas Ferris.

Called Dateprog, the subroutine's capabilities include validation of date fields and the conversion of dates from Gregorian to Julian and from Julian to Gregorian.

A number of days can be added to or substracted from a given date; the number of days between two dates can be determined; and, for a given date, the day of the week can be determined, the vendor said.

Dateprog can be purchased for $500. A 60-day free trial is available from Thomas Ferris, 390 Elmwood Ave., Buffalo, N.Y. 14222.

DEC Users Offered Package For Architectural Accounting

BOSTON — A software package for Digital Equipment Corp. computers that provides accounting control over architectural projects has been introduced by Frontier Management Systems, Inc.

The Architectural Accounting Package performs payroll, payables and receivables while providing project reporting by month, project and year-to-date for comparing billings and expenses with the projected budget. It also provides a report history by project, division, account and state.

Accessed through self-prompting commands, the package automatically transfers payroll, payables and receivables data to project status reporting, the vendor said.

The Architectural Accounting Package costs $15,000 from the firm at 214 Harvard Ave., Boston, Mass. 02134.

Cobol Program Generator Targets PDP-11, VAX Users

ELMWOOD PARK, N.J. — A Cobol program generator called System Builders-5 (SB-5) was introduced here by Business Controls Corp. for Digital Equipment Corp. PDP-11 computers running under RSX11-M, RSTS/E or IAS operating systems and DEC VAX equipment running under VMS

SB-5 is said to produce source Cobol application code, as well as system, program and operating documentation. The licensing fee is $28,000 for the use of SB-5 with a single CPU, with multiple site discounts available.

The license includes training, installation materials, a reference manual and user guide. It may be acquired on a 60-day trial basis for a nonrefundable fee of $1,000, which may be applied against the total license fee.

Business Controls Corp. is located at 507 Blvd., Elmwood Park, N.J. 07407.

Self-Study Video Training Aids Programmers, Managers

AVON, Conn. — A self-study video training package designed for system programmers and management, software developers, support analysts and debugging personnel, has been announced by Computer Systems Research, Inc.

Students can reportedly choose from 60 videotape modules and more than 3,000 pages of self-study wordbooks.

The modules can be purchased for $720 each or rented monthly for $17 to $55 per module from Computer Systems Research, Inc., 195 W. Main St., Avon, Conn. 06001.

Users Can Look to Packages To Shave High Personnel Costs As Application Demand Soars

By James M. Tharrington
Special to CW

At a time when DP personnel costs in most organizations amount to more than 50% of budget totals and DP salaries continue to rise, a serious shortfall in qualified personnel is becoming evident. Confronted by a lack of qualified programmers to develop applications, more end users are looking to software packages as a solution for the constantly growing demand for application systems.

Software packages today provide an excellent return on dollar investment. With the cost of custom programming increasing dramatically because of the time required to develop application software and the shortages of qualified programmers, the software package is a bargain.

The user can buy a package that has been fully tested and is operating in other locations while receiving full maintenance protection against errors and, in most cases, package improvements and enhancements. In addition, the package is usually available for the customer in a matter of days.

However, the software package selector must undertake substantial and organized effort if the product selected is to fulfill its advertised promise in an end-user environment.

It is most important to determine end-user needs before searching for specific vendors. If these requirements have not been clearly identified in a formal systems study, the company should form a user group composed of staff members — running the gamut from clerk to manager — to get a cross section of views and experiences.

Initially, this user group does not have to identify precise requirements. However, it should provide an overview that results in a formal user group document. This can be done with a flowchart identifying system inputs, outputs and the types of processing that must be performed upon the input in order to produce the output.

Software application packages can be real bargains — given the shortage of qualified programmers, they represent a realistic solution to the growing need for application systems, Tharrington believes. However, he warns it is up to the purchaser to ascertain whether the package meets the needs of its end-user department.

Based on this overview, vendors can be selected for initial screening to determine whether their software packages fit the requirements identified in the user group document.

When dealing with software vendors, it is important to stress that this first inquiry is general in nature — an attempt to determine the software that is available. Therefore, the information requested should be that which is typically provided in brochure form by these firms.

Questions about price and benchmarking can be reserved for a later time. At this point, information about the package and/or product lines is needed in order to make the first comparison between the end users' needs and software package capabilities.

Evaluating a vendor is never a simple task. Length of time in the business, market served, number of products and number of installations should all be consid-

(Continued on Page 44)

Dictionary Runs On DOS, OS Gear

GREENVILLE, R.I. — The Data Administration Directory (DAD) and the Dynamic Table Manager (DTM), two packages for IBM and plug-compatible systems running under the DOS and OS operating systems, are available from Data Administration Software, Inc.

DAD is an interactive data dictionary/directory package that reportedly facilitates the control and documentation of the corporate data resource. It was designed to satisfy traditional documentation requirements as well as the data administration function.

DTM is said to allow programs to access externally defined tables at program execution time. Tables needed by an application program are dynamically loaded and the required core storage is obtained by DTM, the vendor said.

It reportedly supports binary, displacement and sequential tables and five different search strategies.

DAD has the capability to document systems, jobs, programs, media, data structures and data elements, the vendor said, adding that it has an optional CICS display. DAD includes DTM; the latter has an optional CICS interface.

The DAD uses either Cincom Systems, Inc.'s Total data base management system or IBM's Vsam; DTM uses Vsam.

The license fee for DAD ranges from $17,000 to $21,000. For DTM only, the fee is between $5,000 and $6,500, the firm said. More information is available from the vendor through P.O. Box 528, Greenville, R.I. 02828.

Ramis II Gains Extended IRM

PRINCETON, N.J. — Mathematica Products Group (MPG) has released an extended version of the Interactive Request Modification (IRM) component of its Ramis II data base management system.

IRM/E reportedly enhances the existing IRM capability to correct a syntax error interactively or modify an existing request before resubmitting it.

The new version also is said to allow the user to build, test and modify a series of requests interactively and, afterward, to catalog them in the Ramis II Executive Library. The user may retrieve, combine, modify and submit one or more existing requests from the library, MPG said.

IRM/E is completely contained within Ramis II and operates under IBM's Interactive Computer Control Facility, Time-Sharing Option and CMS, the vendor said. It reportedly is portable across the major IBM operating environments.

IRM/E is a separately priced component of the Ramis II system. It replaces IRM, which is provided at no charge. IRM/E reportedly provides all of IRM's capabilities, and is available immediately with Release 2.1 of Ramis II for a $3,500 fee.

The vendor can be contacted through P.O. Box 2392, Princeton, N.J. 08540.

Print Facility Aids 3270 Users

GARDENA, Calif. — Dataquest Systems has announced Remote Print Facility (RPF), a package that interfaces IBM VSE/Power queues to enable end users to display or print reports on IBM 3270 CRT terminals.

RPF uses IBM-supplied macros to facilitate its I/O to the Power queues and therefore runs on any equipment supported by IBM DOS/VSE operating systems, the vendor said.

RPF 3270 printer support reportedly includes forms lineup for special forms and start or restart printing at any page or line number.

RPF is being offered at an introductory license fee of $2,100 from Dataquest Systems at 15514 Ogram Ave., Gardena, Calif. 90240.

Packages Can Shave Costs

(Continued from Page 43)

ered in the analysis and a good vendors should supply all this information. One of the best ways to appraise a particular vendor's product is to speak to the firm's customers — especially to users whose names you obtain from industry sources or from other users with non-vendor-supplied contracts. This process should provide an unbiased picture of a specific vendor's package.

Traditionally, the next step is to request proposals from those vendors that have passed the preliminary evaluation with a product that apparently matches end-user needs. The proposal should test the product in terms of license or contractual agreement; costs of upgrading the product; guarantees; and the location, number and availability of support people. The request for proposal (RFP) is the first step in forcing the vendor to be specific about the product.

Pricing Arrangements

Pricing arrangements from the RFP should be carefully scrutinized and compared with those of other companies. Determine if there are any additional costs for multiple installations, the cost and length of any warranty and the costs for maintenance during and/or after warranty expiration. Potential system cost can be spread in any number of ways to enable it to be brought to a measurable level that is comparable to other packages.

Based upon pricing and earlier considerations, the selection of a group of software finalists may be appropriate. Then, either benchmark evaluations should be performed or the software should be brought in-house for a trial evaluation. Keep in mind that the DP department must expend hours in preparation for the actual benchmarking of any application package. Therefore, the advantages obtainable through benchmarking must be weighed against the availability of resources and time to perform a benchmark.

Final Selection

With costs and benchmark results in hand, a final package selection can be made. Vendors should now be approached to establish a contractual arrangement and a firm purchase or lease price.

Ideally, a contract should be negotiated with the chosen vendor because this document provides leverage in case of future problems.

The following points should be considered when contracts are drawn:

- Penalties, if any for late or incomplete installation and delivery should be spelled out.
- Any mutually agreed upon modifications, including responsibilities and deadline dates, should be specified.
- Provision should be made that the software vendor will correct any bugs and furnish any required maintenance at no additional cost for some guaranteed period after initial installation and acceptance.
- Training, support and maintenance should be specified in detail and additional costs of these services after a given time should be identified. Items delivered by the vendor and the form in which they are delivered should be specified.
- Purchasers must be prepared to respect proprietary rights of the software vendor.
- Final payment for the package should be contingent upon delivery of all products and services specified and successful operation of the package for a specific time period.

Even though a benchmark may have been performed, it is important that the purchaser initiate a rigorous check to verify the software results.

Tharrington is a principal of Case and Company, Inc., management consultants in Stamford, Conn.

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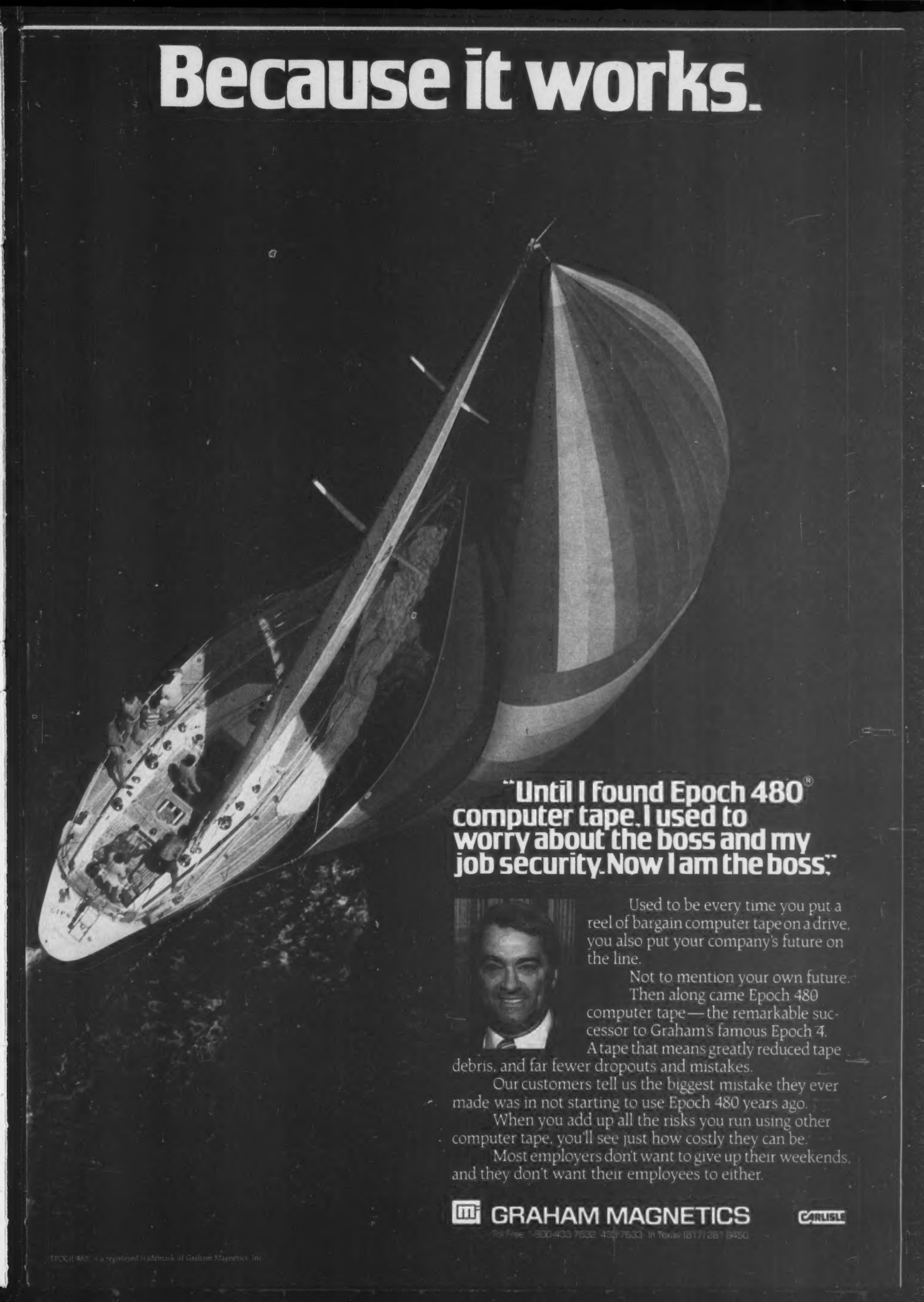

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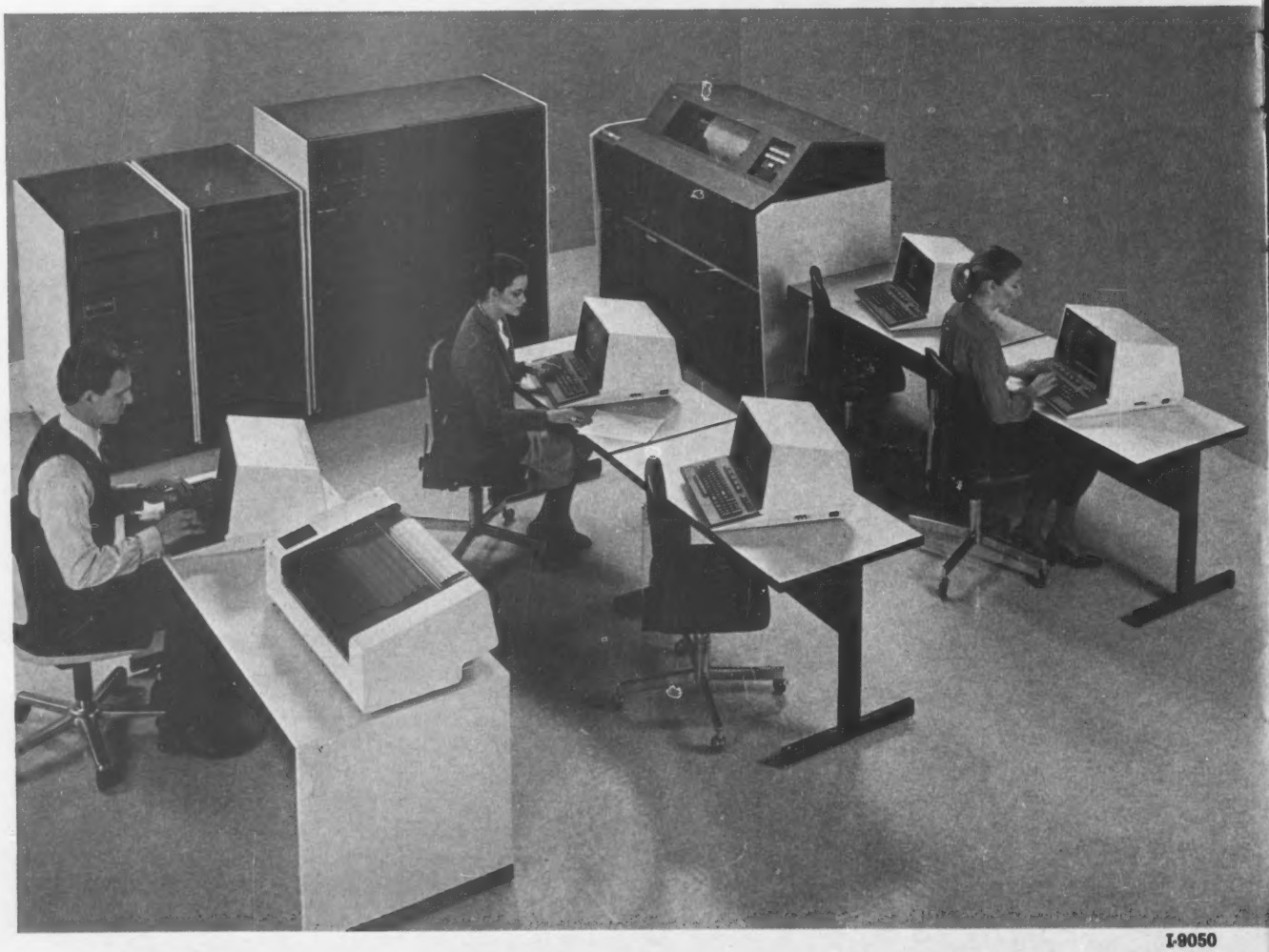


I-9050

Ranging from an 8-bit desk-top system to a 32-bit mainframe.

The I-9000 Series provides one of the largest selections of interactive configurations in the industry. It steps through four levels from an enhanced desk-top micro-system to a 32-bit mainframe, a new top-of-the-line system which more than doubles the interactive power available from NCR.

Migration is smooth and easy from bottom to top even across the system boundaries. The I-9000 Series is a step beyond and fully compatible with the I-8000 systems.

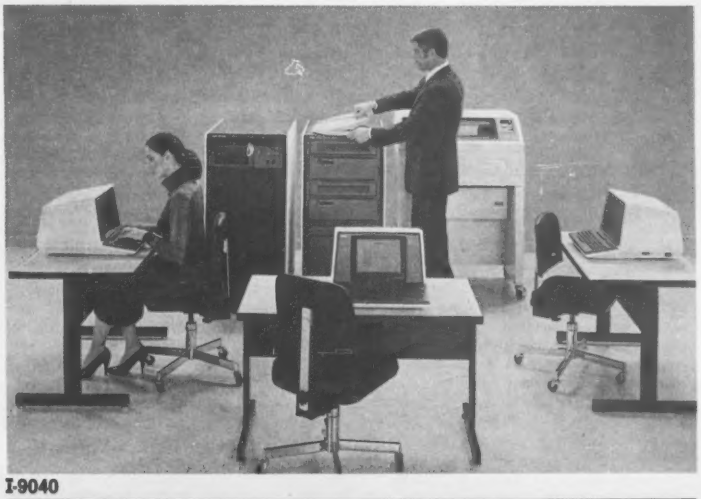
The subtle new styling is more than skin deep, it's ergonomic. With features like detachable keyboards and non-glare glass, every workstation can accommodate any operator in comfort. With less fatigue and eye-strain. New lines and colors blend into any office or computer-room setting. Eventually, the new styling and ergonomics will pervade the entire NCR product line.

New software capabilities provide support for COBOL, BASIC, communications, data base management and transaction processing. And a correspondence-quality printer is now available as well.

For more information on the I-9000 Series, call your local NCR office, or write to EDP Systems, NCR Corporation, Box 606, Dayton, Ohio 45401.

NCR
Complete Computer Systems

I-9010



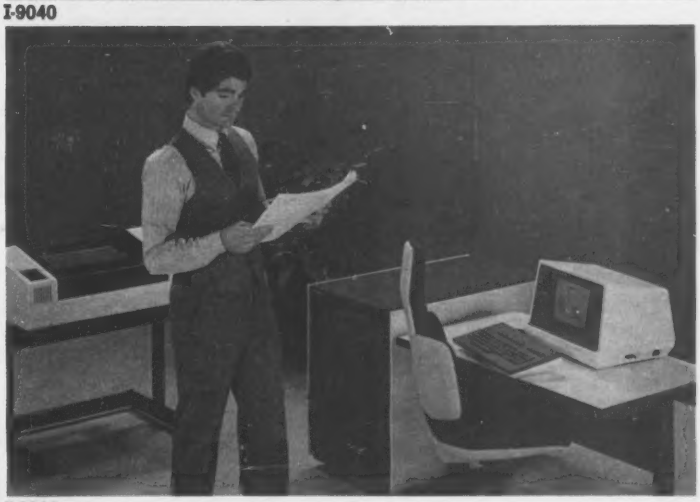
I-9040

The new I-9050 32-bit mainframe uses NCR's powerful Interactive Resource Executive operating software and provides up to three megabytes of memory. It increases NCR's interactive power spectrum 2.6 times.

The I-9040 is a powerful and versatile 16-bit minimainframe with up to 2 megabytes of memory. It features a smaller footprint and virtual memory technology based on the successful I-8400 architecture.

The I-9020 is a 16-bit general-purpose single-board minicomputer with main memory of half a megabyte. It features higher reliability, lower noise level and lower power consumption than its predecessor, the I-8200.

The I-9010 table-top 8-bit micro-oriented system offers advanced ergonomic design, multi-language support and communications capability. It is easy to operate and understand.



I-9020

Consultant Guarantees Support

NEW YORK — A consulting service that guarantees maintenance and enhancement of software for users of hardware ranging from mainframes to minicomputers has been announced by CAP-CPP Services, Inc.

According to the company, which is a subsidiary of the UK's Computer Analysts and Programmers (CAP) Group Ltd., its Software Support Services (SSS) supplies a user with a support team of analysts and programmers under an experienced project manager who are always available for consultation.

The team is assigned to a client depending on factors such as the size and complexity of the system, programming languages and geographical location, the company stated.

After a team is assigned, system documentation is reviewed and improved if need be, CAP-CPP said. The company then guarantees the client that at least two members of the team will monitor the system and that vacation and absences will be planned to avoid a lack of coverage.

The SSS team maintains a full library of documentation on the support system and is able to immediately respond to system failures or urgent changes, the company said.

Charges for SSS vary depending on the size of a shop and type of system, but the average annual charge for a system with about 300 programs is $20,000, a CAP-CPP spokesman said. The standard hourly rate is $43.50, he added.

More information can be obtained from CAP-CPP, 521 Fifth Ave., New York, N.Y. 14301.

Service Backs Credit Card Use

GREENWICH, Conn. — A computerized credit card authorization system to defend against credit card theft and fraud has been announced by The Service Bureau Co.

Using electronic cash registers as computer terminals, sales clerks enter credit card information that is transmitted to the company's CPU for verification against stolen card lists. Credit lists are also checked against the intended purchase amount and verification made, the company said.

The Telemoney service is available to banks at prices that vary with the number of transactions and location of the bank, the vendor said from 500 W. Putnam Ave., Greenwich, Conn. 06830.

'F/A Plus' Update Adds Features To Handle Federal, State Taxes

NEEDHAM HEIGHTS, Mass. — McCormack & Dodge Corp. has introduced Version Five of its Fixed Asset Analysis and Accounting System, known as F/A Plus.

Version Five reportedly offers up to three additional and independent tax books, a horizontal math feature on the package's report writer, Financial Accounting Standards Board (Fasb)-13 lease accounting, variable investment tax credit rates and microfiche capabilities for large reports.

These enhancements are in addition to F/A Plus' standard features, which include multicorporation capability with user-defined variable hierarchy; separate book and tax processing; depreciation expense projections; flexible processing options that allow for accounting cycles of 12- or 13 week-periods or quarterly periods of 4-4-5, 4-5-4 and 5-4-4 weeks; and inflation accounting consistent with Fasb-33, the vendor said.

Information Generated

F/A Plus Version Five was designed to generate all federal and state tax information; determine the optimum depreciation method and tax regulation combination; structure asset depreciation range vintage accounts; and perform gain and loss calculations on asset retirements, including depreciation recapture under Sections 1245 and 1250 with proper capital gains treatment under Section 1231.

Version Five reportedly will interface with CPA Plus, the McCormack & Dodge Capital Project Analysis and Accounting System, as well as with its G/L Plus General Ledger System.

F/A Plus Version Five ranges in price from $21,500 to $23,000, depending on the user's equipment. Documentation support and user training also are available, the vendor said from 560 Hillside Ave., Needham Heights, Mass. 02194.

Accountech Offers 'Finplan' For System/32

FARMINGTON HILLS, Mich. — Accountech Systems, Inc. announced the availability of its Small Business Financial Planning and Modeling System (Finplan) for the IBM System/32.

Previously available only for the System/34, Finplan was reportedly designed to produce projections for balance sheet, income statement, cash flow, ratio analysis and graphs.

The System/32 version is upwardly compatible to System/34 Finplan, and is priced at a one-time fee of $950, the vendor said from 28104 Orchard Lake Road, Farmington Hills, Mich. 48018.

Prime Users Get 'Intact 50'

ANN ARBOR, Mich. — T&B Computing, Inc. has introduced integrated accounting software for on-line, distributed processing on all Prime Computer, Inc. 50 series V-mode computers.

Intact 50 software is currently available with general ledger, accounts receivable, accounts payable, fixed assets, order entry, payroll, subscription fulfillment and report generator modules.

Modules reportedly can be combined to build a system in which there is a common data base, as well as shared master files and transaction stream.

Each module was designed for interactive processing, T&B said, and prices begin at $8,000/module from 3853 Research Park Drive, Ann Arbor, Mich. 48104.

Conversion Software Aids In Moving Cobol Programs

MINNEAPOLIS — Parameter- and macro-driven conversion software aimed at moving Cobol applications programs from one computer system to another has been announced by Technalysis Corp.

The Technalysis Automated Conversion Services (Tacs) process is centered around a macro processor that provides the opportunity to correct, improve, standardize and personalize the programs for a new environment, a company spokesman said.

By-products from the process include Job Control Language for program testing, file conversion and production running, together with a set of planning and project management reports, according to the Technalysis spokesman.

Tacs is priced at between $25,000 and $40,000, depending on training and testing requirements, exclusive of program conversion.

More information is available from Technalysis Corp., 6700 France Ave. S., Minneapolis, Minn. 55435.

Runs With MDPS

Finance Update Targets 8150 User

MINNEAPOLIS — Open Systems, Inc. unveiled enhancements to its financial accounting software, designed to operate with the Multiple-Workstation Direct Processing System (MDPS) on the NCR Corp. 8150 computer.

The set of applications, marketed as the Software Fitness Program, includes sales order processing, accounts receivable with billing and sales analysis, accounts payable, general ledger, inventory, payroll and job cost modules.

The major enhancements include multiterminal use for up to four CRT terminals, printer spooling and full screen formatting for 12-in. CRT screens, the vendor said.

Other Additions

Also added were advance earned income credit processing in payroll, additional parameter selection on reports for multicompany flexibility in general ledger and the ability to process temporary vendors in the accounts payable system, according to Open Systems.

Enhancements to accounts receivable reportedly include the ability to calculate the cost of goods sold with an automatic post of both finance charges and cost of goods sold to the general ledger system.

The user documentation has been revised and improved as a training tool to aid the user in understanding basic accounting principles and how these principles apply to the entry and reporting of accounting data in the system, the firm said.

The seven applications in the Software Fitness Program for the NCR 8150 with MDPS currently are available and can be licensed by NCR end users for $1,250 per application, including software support and documentation.

Open Systems is located at Suite 409, 430 Oak Grove, Minneapolis, Minn. 55403.

Health System Runs on IBM 38

CORAL GABLES, Fla. — Dynamic Control Corp. is offering an integrated family of applications to IBM System/38 users in the health care industry.

The software includes a Hospital Patient Management System that consists of an admission-discharge-transfer program, census, outpatient registration, patient billing, accounts receivable, order communication and results reporting. It costs $50,000 for a one-time license fee.

Also introduced were a pharmacy management system costing $30,000; a general ledger package costing $20,000; and medical records, payroll personnel and accounts payable packages for $15,000 each.

A laboratory management system with instrument interface and a property accounting package was also introduced, but the prices have not yet been determined.

All of the software is also directly interfaceable with the IBM Field-Developed Program for the System/34, Dynamic Control said from 250 Third Road, Coral Gables, Fla. 33146.

Hogan Adds Packages For Banking Industry

DALLAS — Hogan Associates, Inc. has added two software packages to its integrated Transaction System for the banking and thrift industries. The additions, which include a Customer Information System (CIS) and a Relationship and Product Management System (RPM), reportedly can run on any IBM-compatible system.

CIS is an integrated on-line customer information management package that reportedly supports all major bank and thrift applications, including retail and commercial demand and time accounts; certificates of deposits; retirement accounts; mortgage, commercial and installment loans; and debit and credit cards.

In addition to typical support for customers, addresses and accounts, the CIS system supports "householding" for household-based marketing and information retrieval, the vendor said. The CIS package costs $75,000.

The Relationship and Product Management System provides the banking and thrift industries with on-line customer profitability analysis, modeling and cross-application pricing and can integrate with the CIS system or be used on a separate basis, according to Hogan Associates.

The RPM package provides parameter-driven flexibility to support commercial and retail customer relationships in a multibank, multibranch environment, the firm said. Multiple profitability analysis calculations and multiple funds pool support is provided by the system. The RPM package costs $60,000.

Hogan Associates is at Suite 216, 1120 Empire Central Place, Dallas, Texas 75247.

'Aims' Targets PDP-11 User

LOS ALAMITOS, Calif. — An apartment management service is available on a time-sharing basis from Software Techniques, Inc.

Called Apartment Information Management Services (Aims), the system consists of an integrated package of accounting software that runs on Software Techniques' Digital Equipment Corp. PDP-11/70 computer in Irvine, Calif.

Users of the Aims system can either purchase or lease the necessary terminal and printer, the vendor said, and the terminals can be connected to the Aims computer via telecommunications.

Aims reportedly handles accounts receivable, tenant cash receipts, lease applications processing and posting.

Aims carries a monthly fee of between $600 and $1,500, the vendor said from Suite 101, 5242 Katelle Ave., Los Alamitos, Calif. 90720.

Package Out For Clinics

SUNNYVALE, Calif. — A medical accounting package written in Business Basic and designed to be used in a multiuser, multiclinic environment has been announced by Mercator Business Systems, Inc.

Designed for use with the company's 16-bit desktop microcomputers, the system operates in real-time allowing charges, payments, opening of new accounts and changing of account information as needed, the vendor said.

The package includes account bookkeeping functions, statement processing, automatic accounts receivable aging and past-due and final-notice letters to delinquent accounts.

The medical accounting software package is priced at $3,000 from Mercator Business Systems, 1294 Lawrence Station Road, Sunnyvale, Calif. 94086.

IN DEPTH

A Guide to Preparing An MIS Standards Manual

By M. A. Ritlaw

To have a smoothly working shop, employees need specific information detailing the responsibility, authority, technical considerations and established procedures for their installation. A management information systems (MIS) information manual is the best way to let employees know how to perform their job tasks in the most efficient and productive manner.

The MIS information manual will ease the impact of personnel turnover. It is an orientation tool to help new people become productive faster. With standard ways of doing job tasks, it will be easier to take over someone else's work. If you put all the necessary internal forms in the MIS information manual, the new person won't have to hunt through his desk and then bother a co-worker each time it's necessary to fill out a form.

Surveys show that technical people like to be self-sufficient. They want to do their jobs without bothering their coworkers. Therefore, information should be made available to them in a quality, user-friendly MIS information manual.

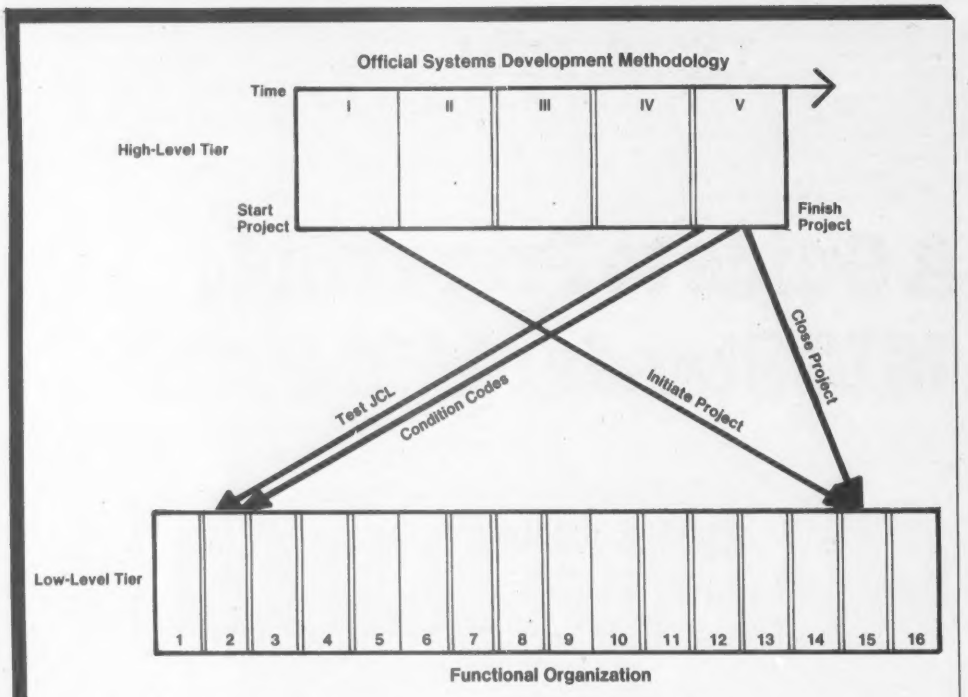
Organization/Layout

Gather the old standards, notes from long-term employees and internal memos you might want to include in the manual. Rewrite anything that is not well-written. Keep in mind your installation's needs when you try to organize the material.

Large DP shops need more detailed procedures because their departments interface with others in a more formal way. More written communication is necessary and more forms need to be

(Continued on In Depth/2)

IN DEPTH



The high-level tier is the project development cycle organized by when each task should be done.

The low-level tier is functionally organized. When you need specific information such as Programming.Modular, you can find modular programming information in the programming section.

Each section of the high-level tier could send you to any section of the low-level tier. For example, forms would have to be completed in every section of the high-level tier. But all the administrative information to complete the forms — along with a copy of the form — would be in the administrative section. Therefore, every high-level tier section would send you to the proper subchapter of the low-level tier administrative information section.

Figure 1

(Continued from In Depth/1)

completed. Each person performs a specialized function and formal documentation is required for control purposes.

Procedures for small DP shops can be less detailed. People talk more with each other, so there are fewer and simpler forms to complete. Managers can control a small shop without complicated procedures.

You'll need an on-line word processor to facilitate developing and maintaining the MIS manual. The word processor can automatically format each page with the section name, chapter title, subchapter title, page number and month and year issued.

Enough white space should be left on the page to make it attractive to the eye. This can easily be done with most word processors.

Table of Contents

Next , formulate a high-level table of contents for your manual. The titles have to be accurate and descriptive to communicate what you intend to cover in each area.

Should your manual be organized by function? If so, whose view of the functional organization? An analyst's, a programmer's or an operation's? Should it be by department? Or should the information be organized to follow the project life cycle from start to finish? What would work best for your manual users? You have to analyze your installation to decide the best MIS manual organization for your shop.

For large organizations, you might use a two-tier approach (see Figure 1). Have a high-level tier that lists — from start to finish — each task that must be done in a project life cycle. Have pointers from the high-level tier to a second and larger low-level tier that tells:

- How to get things done.
- What paperwork is necessary including a copy of the forms needed.
- Installation conventions.

The high-level tier is the installation's official MIS systems development methodology. It helps your people think clearly and organize their work. It lists the tasks they have to do, especially the analytical and design steps that are often overlooked.

Remember, it is easier and less expensive to correct the analysis and design than it is to correct a system after it is programmed. If you guide people step-by-step with a sound methodology, they will be better organized and will produce a system of higher quality.

The low-level tier (see Figure 1) contains details of how to do the job and related information. It would contain copies of forms that need to be filled out, information on in-house developed software and the installation's technical efficiencies.

Smaller shops might prefer a simple functional organization. This could be in one book that contains

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PREPARING A STANDARDS MANUAL

IN DEPTH

(Company Name) **Sample Manufacturing Company**

(Chapter Name) **Programming Modular**

(Head titles help locate information.)

Modular Programming Considerations.

Follow all the recommendations in Programming. General. Considerations. Programming. General. Considerations. discussed subjects such as:

(Lists help emphasize important points.)

- Structured programming.
- Accurate descriptive names.
- Use of variables.
- Condition codes.
- Internal program documentation.

Reasons for Modular Programming.

It is easier to solve a complex problem if you separate it into many simple problems and solve one simple problem at a time. If properly modularized, the simple problems — or programs — are easier to understand. Because they are easier to understand, they are easier to:

- Specify.
- Code.
- Test.
- Debug.
- Maintain.
- Change.

Determining Program Modules.

Each program module must be self-contained and independent. A module should be a discrete entity with a single entry point, exit point and only one return point into the control program.

(Chapter name, page number, revision date)

7.5 Programming Modular
Page 2
81/06

Figure 2

Sample Manufacturing Company

Complex programs should be broken down into modules that contain a simple functional process. Never group two processes into one module just because they can share several lines of code. When there is a change to one process, the change will probably make the second process wrong. Instead, consider designing modules that contain the following discrete processes:

- Table lookup.
- Computations.
- Record transaction information.
- Combine data from several sources into one report line.
- Print.

Detailed structure charts often indicate potential modules.

For More Information:

Our internal library has several books describing modular programming considerations.

Programming.Modular.Implementation.

This installation will only use dynamically called submodules because they can be changed without relinking and re-editing the associated unchanged modules.

Exhibit 7.9 (next page) shows the statements needed in the control and submodules.

For More Information:

- Programming.JCL.Compile provides sample JCL for submodules.
- IBM OS/MVS Cobol Compile and Library Programmer's Reference Guide.
- OS/MVS linkage editor and loader.

Figure 3

the official methodology and also includes the how-to-information.

At this point, you should discuss your plans with people from other MIS departments — just to make sure you have thought of everyone's needs. You might get some good ideas from other people. Later in the MIS manual project, you will receive better cooperation from people who feel they provided input to your project.

To find information fast, you need a well-planned index. A good word processor will assist you, and it will create the index for you mechanically. Also, the index will provide the necessary pointers from the high-level tier — the methodology — to the low-level tier — the how-to-do things.

Do you want the MIS information manual on-line? Consider:

- How often you want to skim through a manual.
- How long it takes to turn a page, or response time.
- What is to be done if the system is down.

As a compromise, you could put just the index and glossary on line. The advantages of an on-line index are:

- Seldom having to turn a page of the index — after you find the index topic.
- Leaving the index on the screen as you go to more than one chapter of the manual. It is very convenient.

An on-line glossary would also be convenient. You could then find the meaning of a term — without losing your place in the manual.

MIS Manual Contents

Information needed by a reasonable number of your employees and not readily available elsewhere (for example, in an IBM manual) should be included in your MIS manual. It should be a convenient central place to keep such information as your installation's:

- Configuration.
- Programming efficiencies
- Security procedures you want known to your employees.
- Disaster recovery information you want known to your employees.
- Internal forms.
- Documentation for in-house developed software.

It should also contain clearly established do's and don't's for your installation and state who is responsible for what in your DP organization.

Not everyone will need every section of the MIS manual. Subsets of the manual can be provided for some job classifications. However, anyone who requests a section should receive it - that person might want to study for a future job in the organization.

After you have a tentative table of contents, decide the priority of each section, chapter and subchapter, from most critical areas to useful areas. Consideration should be given to such questions as:

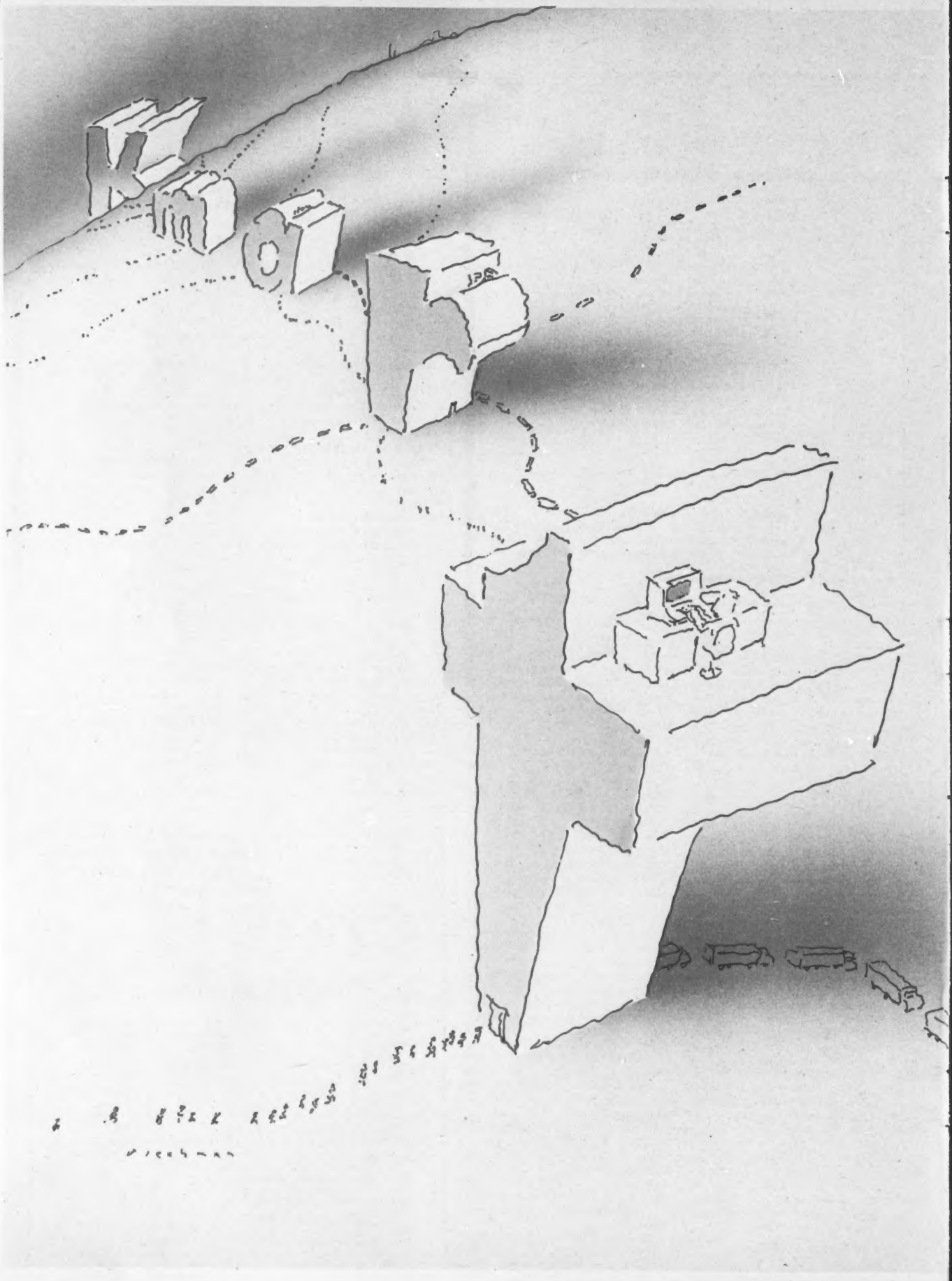
- How much confusion exists in the area?
- Are people now doing it the wrong way?
- How much is the lack of information costing you in people time, computer time and disagreements among personnel?
- How much information is needed by your people?

If the table of contents includes areas that don't fall into the above range, don't include the area in the manual - it will just make the manual bulky and decrease its effectiveness. Don't include a chapter just because someone said it should be there. Go on the basis of your company's needs.

You have better ways to commit your people resources than to write unnecessary chapters in manuals. Good usable information is extremely important. Don't contaminate your manual with extraneous information.

Remember the purpose of the MIS manual is to quickly convey necessary information. It is not written to impress the reader with the author's vocabulary or knowledge. We call it egoless writing. The reader is busy and time is very expensive. The more quickly and easily the information is conveyed, the more valuable is the MIS manual. When you consider the number of people who will read each chapter, you will realize how important its readability is.

(Continued on In Depth/6)



Even a big business can use a little IBM.

Gerry Fletcher, V.P. Of Corporate Information Systems, K mart.

K mart is one of the world's largest retailers. But that doesn't mean they use only the largest computers.

In fact, K mart has bought hundreds of IBM's smaller computers, the Series/1. And they've ordered more.

And that shouldn't surprise anyone.

Gerry Fletcher, K mart's V.P. Of Corporate Information Systems, explains. "We needed to have processing capabilities available at local stores similar to those we have at headquarters. Series/1 has more than met our needs."

One need was freeing central management from long waits for local data.

"Now local stores can forward orders electronically to headquarters and on from there directly to the vendors."

And K mart's store managers needed freedom to do their own processing locally.

"Series/1 has greatly reduced clerical effort by handling many local management applications such as payroll, accounts payable and inventory control."

As K mart has discovered, Series/1 is one of IBM's most versatile computers.

Because it's modular, a wide variety of Series/1 components can be used as building blocks, to custom tailor a solution to many different requirements, ranging from distributed data processing to energy management to industrial automation.

For more information about Series/1, call your IBM General Systems Division representative or write us at P.O. Box 2068, Atlanta, GA 30055.

"Series/1 is helping free K mart to be more productive," says Gerry Fletcher. "In a company like ours, small systems can produce big results."

A little IBM can mean a lot of freedom.

IBM®
General Systems Division

PREPARING A STANDARDS MANUAL

IN DEPTH

(Continued from In Depth/3)

The MIS manual will be more readable if it is written in clear, concise and simple English. There should be no unnecessary words written or ideas expressed.

Use active verbs in a conversational style of writing.

Explain acronyms and terms the first time they are used in a chapter.

Develop a glossary of common terms. The glossary has three advantages:

- If a person is not sure of a term, it will be easy to look it up.
- An official glossary is an inoffensive way to encourage people to use the correct term. The MIS manual will be confusing to a reader if DP terms are improperly used — as is often the case.
- It is necessary to have a standard use of the terms you include in the index. Otherwise people will look up a term only to find information on a different subject.

The table of contents and topic headings should be accurate and descriptive. People have to know what information is covered in an area in order to know if it is the area they need to read.

When possible, put all the related information in one place. When related information is scattered throughout the manual, people have to locate each place the subject is covered and then page back and forth.

If you use the two-tier approach — high-level methodology and lower level explanation of how to do the tasks — make sure you have good pointers from each high-level task to the lower level explanation of how to do the task. The index facility will make it much easier to establish these pointers.

Besides the page format mentioned earlier (standard information on each page), each subchapter, chapter, section and table of contents should be consistent in format. The more consistency throughout the manual, the faster users will become familiar with the manual and the easier it will be to use.

Instead of writing all the information in paragraphs, break out and list important steps.

Figures 2 and 3 illustrate sample pages from an MIS manual in the two-tier approach. When the high-level tier indicates the next task is to design the program, it will include the pointer, "See 7.5, Programming Modular." Note the format as indicated by the margin notes.

All these hints will help to emphasize the material, as well as make it easier to follow each step. The arrangement on the page helps the eye catch the interrelationship of the material. For example, the arrangement will indicate whether one item is subordinate or equal to another item. Like an outline, it makes a graphic representation of the subject matter.

Outline before you write a chapter. It is much easier to rearrange an outline than to rearrange a chapter once it is written.

The writer can easily make sure the outline includes all the topics that should be in the chapter.

Put the outline into a well-organized form before you write the chapter. The chapter must flow in a logical sequence, and if the outline is in the right sequence, the chapter will be too.

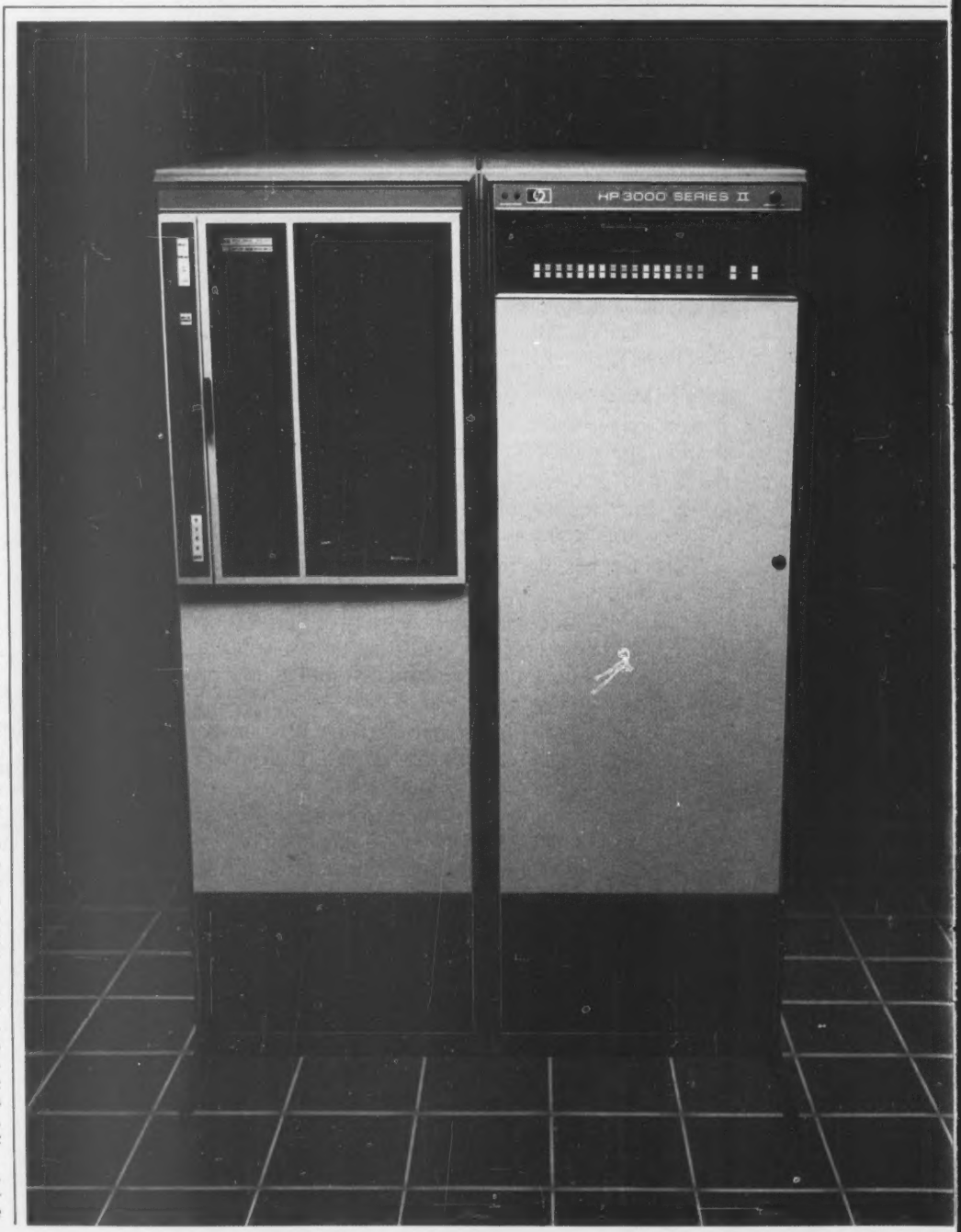
You will save time by outlining. People can outline and then write much faster than they can write without an outline. Also, the quality of the writing is much better when you use an outline.

IBM Conventions

Finally, in areas of the manual used only by technical people, you might want to use some of the IBM manual conventions. The meanings of (), [] and . . . are clear and well understood by technical people. The use of symbols will reduce the number of words needed to convey an idea, and yet the meaning will be clear. Mutually understood symbols will save time for both the writer and the reader.

After you have decided on the organization of your MIS manual, developed your tentative table of contents and decided on writing style, you will need to formally document your project.

Present your project outline to the highest MIS manager for their support. After you have management



PREPARING A STANDARDS MANUAL

IN DEPTH

commitment, present your outline to a committee representing all of the MIS departments. The committee should include both managers and senior staff who will use the manual.

The managers are needed for their authority. The senior staff are needed because they usually know more about the current details of how the organization is — or should be — functioning. With their advice, the managers can make better decisions.

The committee meeting with the managers and senior members of each department functions to:

- Gain their support and cooperation.
- Make sure the manual is tailored to each department's needs.
- Cause you, if necessary, to modify your outline to accommodate other MIS departments. It is better to change your outline now than to change the entire MIS manual after it is written.
- Determine which departments will write and maintain which areas of the manual.
- Establish the ground rules for writing and revising the manual, such as specifying who has to approve chapters after they are written, and who will review writing for quality. Accept only quality writing. Poor writing is not only hard to use, but is also frustrating to users and creates a poor image that will be shared by everyone on the project.

To control the MIS manual project development, it is helpful to make a wall chart to show the progress of the project. On the left list the table of contents. To the right of each chapter heading, show the chapter's priority ranking, due date, author and status.

Under the heading status, indicate the current state of the project, such as:

- Not started.
- Writing the outline.
- Being reviewed (either for accuracy and completeness or for quality).
- Resolving differences, corrections.
- Rewriting (number).
- Final.
- Printing for distribution.
- Completed.

The project will progress faster if you arrange special rewards for the authors. Incentives for authors can be perks for assignments well done, such as lunches, dinners or gifts, or writing training that the writers realize will help them throughout their careers. Employees who can write well are more valuable and are likely to be promoted faster.

Ongoing Maintenance

Even the best MIS manual will slowly lose its value unless the manual is kept up to date. A current MIS manual offers many advantages to the company. New staff, when hired, will have an easy way to become acclimated to the company and, therefore, a shorter learning curve. Other results will be increased efficiency because of better information and decreased frustration for staff when they can easily find out what they need to know to do their jobs.

In order to keep your MIS manual current, you need a clearly defined maintenance process.

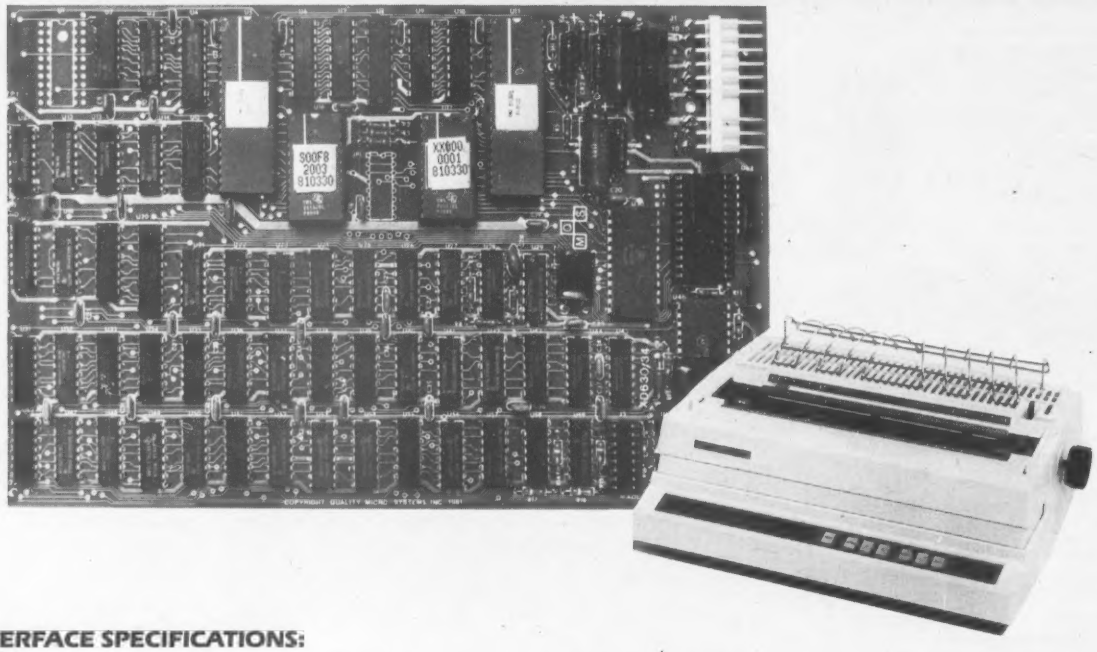
Each department should have people assigned to keep the department's area of responsibility up to date. The assignment should be included in their job descriptions and standards of performance.

The easier it is to initiate a change, the more likely it is the manual user will report incorrect, incomplete or obsolete areas. A telephone call to the central editor should be all that is necessary to initiate a change. If you require the user to fill out a form, the chances are he will not bother to do so, and your fine manual will slowly become obsolete.

Although the procedures explained in this article seem quite a bit of work, rest assured that the final product will have been worth it. After you see the finished manual and find people using it, you not only will have the feeling of a job well done, but will have a more productive DP shop as well.

M.A. Ritlaw spent seven years in cost accounting before entering data processing. Ritlaw has worked as both a programmer and an MIS standards specialist and holds a Certificate in Data Processing (CDP).

QMS Provides LETTER QUALITY PRINTING CAPABILITY ON IBM SYSTEM 34&38



INTERFACE SPECIFICATIONS:
Interface:
Interfaces to System 34 and 38 via twinaxial cable hookup emulating an IBM 5256 printer.
Self Test:
Multiple built in self test capability.
Cable Thru:
Cable thru feature is standard: Up to 6 devices may be daisy chained together on a single twinax port.

PACKAGING:
Interface is contained in a spare circuit card slot inside the printer. The twinax connectors, self test switches, address switches, cable thru/terminate switch and indicator LED's are all contained on a bracket mounted on the rear of the printer. There are no external boxes required.

PRINT FEATURES:
Supports printer features via simple easy to program sequences using printable characters. Print features include:
Variable line spacing
Variable column spacing
Bidirectional paper feed
ASCII Character set: 128 characters

Printer Description:
The Xerox Model 1730 is a reliable, high-quality full-character serial printer which provides application flexibility and superior print quality at a low cost. Innovative design features allow the 1730 user to interchange plastic and metalized print wheels on the same printer, a technological breakthrough providing greatly increased versatility in word processing and multiple forms handling applications.
In addition, the 1730 mechanism has been designed to contain even fewer moving parts and adjustments than its HyType II predecessors, further enhancing the reliability and maintainability of the printer. Electronics consist of plug-in printed circuit boards, providing ease of fault isolational.

Print Wheel Interchangeability
The Xerox Model 1730 is the first serial daisy wheel printer to offer complete interchangeability between metal and plastic print wheels. Now users can freely interchange between all Diablo/ Xerox print wheels, thus having the flexibility to select the appropriate plastic or metal print wheel for the application. And the sophisticated and discerning user does not sacrifice print quality to obtain this versatility. Every aspect of the Xerox 1730 design has been focused on maintaining outstanding print quality.

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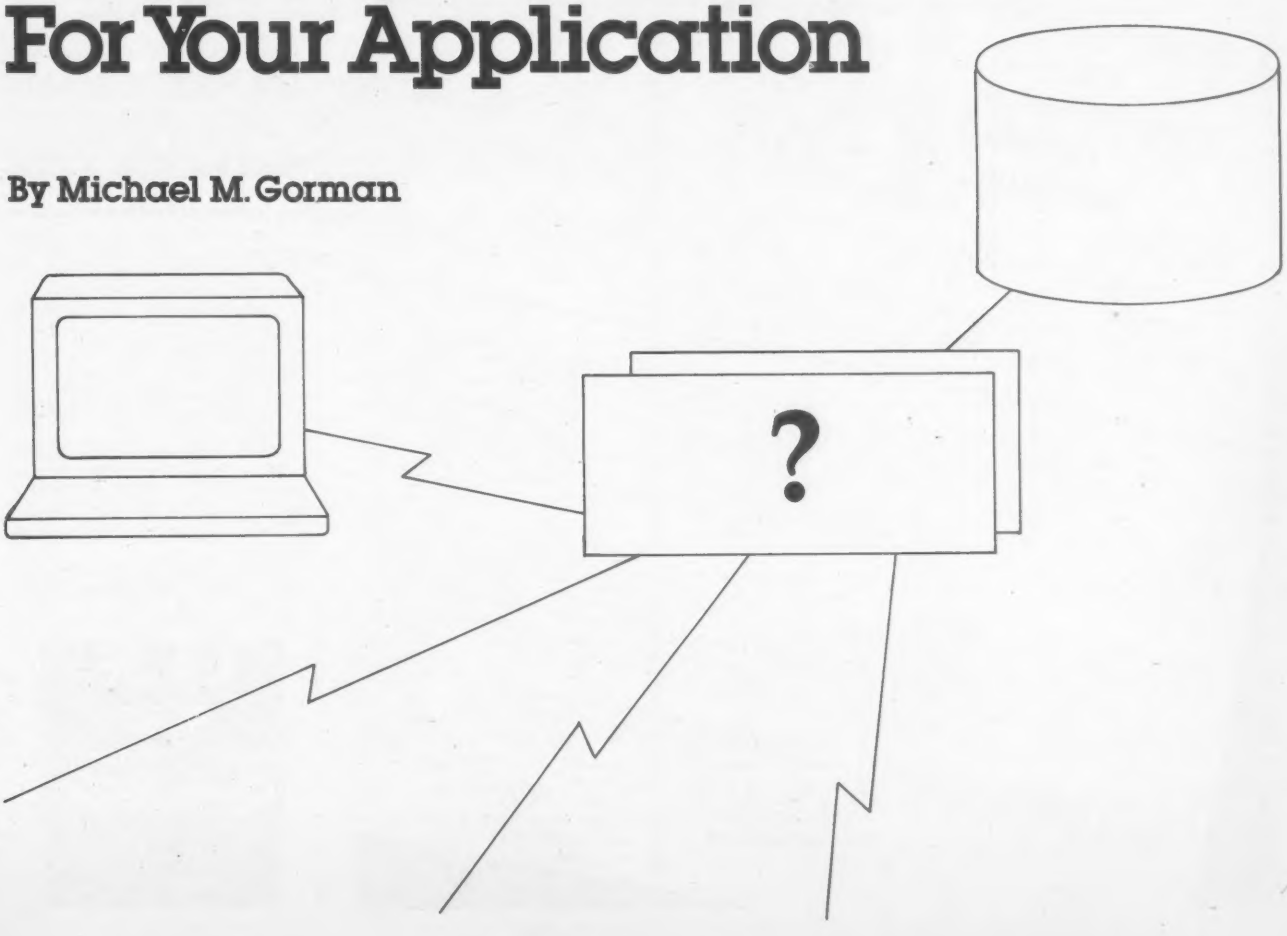
Choosing The Right DBMS For Your Application

By Michael M. Gorman



Since the advent of data base management systems (DBMS) in the early 1960s, it seems that the good and bad experiences with DBMS have been about equal in number. Are these bad experiences the fault of the installation, the DBMS, changing application specifications or incompletely trained users? Depending upon whom you ask, the answer will always be different.

Probably all deserve some blame. This article, however, addresses only those aspects that relate to data base applications and attendant DBMS. To this end, this discussion has three premises:

1. Applications and DBMS should be classified as either static or dynamic.
2. An application might evolve from dynamic to static and thus need to be reimplemented from one DBMS type to another.
3. Because of the diversity of applications in an installation, justifications for multiple DBMS do exist.

Types of Applications

• *Static Applications.* How many times since the creation of data processing has a bill of materials (BOM) system's design been substantively changed? Few times, if ever at all. The reason is simple: the process' design is static. For this kind of production application, the software is written once and runs for years. And because it runs for years and years, with voluminous transactions, the software written to process BOM is "very close to the machine."

This software must be well-designed and very expertly implemented. A large effort is justified because the design changes are few and because the throughput required is very high.

Similarly, there is a class of data base applications that are static — that is, they are less prone to change than others and require very high throughput over a static set of relationships. These applications thrive on a certain kind of DBMS. Data base benchmarks principally based on static-relationship processing have, over the years, shown this assertion to be true. These DBMS are designed around static relationships.

The critical characteristics of such DBMS are cited in Figure 1. Examples of static-relationship DBMS are Cullinane Database Systems, Inc.'s IDMS, Sperry Univac's DMS-1100, Cincom Systems, Inc.'s Total, IBM's IMS and Intel Corp.'s System 2000.

Applications implemented by static-relationship DBMS should exhibit distinct characteristics. Figure 2 enumerates the more significant ones.

• *Dynamic Applications.* In contrast to static applications is a class of applications for which design changes seem to be a way of life. These changes arise from two sources. First, there are those that appear because the application is new and not yet completely evolved.

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Second, there are changes that are attributable to the very nature of the application.

Dynamic applications tend to require many changes to the record types and relationship types among records to keep the applications relevant to the user's changing needs. These applications also seem to contain smaller amounts of data than static applications and tend to be better suited to an ad-hoc interrogation environment rather than a production Cobol environment. This is because changes are needed faster than programs or changes to programs can be coded.

Again, analogous to applications, there is a class of DBMS that are designed around dynamic relationships. The characteristics of these systems are also cited in Figure 1.

Examples of dynamic DBMS are Model 204, Inquire, GIM systems, Adabas, Datacom/DB, Ingres, Focus, Nomad, System-R, Manage and Magnum.

Dynamic applications implemented by dynamic-relationship DBMS should also exhibit distinct characteristics. The more significant ones are listed in Figure 2.

Two exceptions: System 2000 and Adabas have been classified as static and dynamic, respectively. However, they each exhibit some of the other's characteristics. Notwithstanding this, they are fundamentally as classified.

Problems and Benefits with Static-Relationship DBMS. Applications implemented with static-relationship DBMS can have problems in two areas. The first occurs when a report has to be generated that does not mirror the data base structural definitions. While almost any output requirement can certainly be satisfied, some are ill-suited to the data base's design.

This, in turn, causes the creation of complex programs and the consumption of significant computer resources. Eventually, if that reporting requirement becomes frequent enough, the data base's design must be modified to greatly reduce the processing resources.

The second type of application problem pertains to the data base itself. When a data base needs to be redesigned, it usually involves great amounts of computer and human work involving: the actual redesign of the data base's individual record types; the formal relationships (sets) among the record types; and, finally, the programs that process data from the data base. Programs are often involved because they are usually written with the data base's structure in mind. As a result, once the data base design is changed, the programs that process data from it often require change.

The benefits derived from applications implemented with static-relationship DBMS are as significant as the problems. Because relationships in a static-relationship DBMS are implemented through traditional pointers, all record types must be under the control of a single schema. The DBMS will then always know of all the record types and be able to perform relationship maintenance — logical data base reorganization — from this centralized point of view.

Another benefit is the opportunity for building well-engineered and controlled data bases. This results naturally from the data loading and maintenance, as this process is performed principally through Cobol programs.

These two benefits can greatly increase data base integrity. A final benefit — highly efficient processing — results when the data base structure mirrors the reporting requirements.

Problems and Benefits with Dynamic-Relationship DBMS. Appli-

DBMS CHARACTERISTICS	STATIC	DYNAMIC
Logical		
Record types per data base	Many	One
Relationship mechanism	Pointers	Field values
Physical		
Relationship binding	Load/update	Retrieval
Record keys	Single	Multiple
Data loading	Via structure	Record by record
Record relationship change	Delete and reattach	Field value change
Fundamental application bias	Toward data base design or production	Neutral or ad-hoc MIS-like
Interrogation		
Host language	Well-developed	Poorly developed
Query-like languages	Poor	Well-developed
System Control		
Multiple record-type audit trails	Easy	Hard
Reorganization:		
Logical	Hard	Easy
Physical	Expensive	Cheap
Multiple data base processing	Underdeveloped	Well-developed
Multirecord locks	Easy	Hard

Figure 1. Static-Dynamic DBMS Characteristics

APPLICATION CHARACTERISTIC	STATIC	DYNAMIC
Fundamental orientation	Corporate	Project
Required DBA orientation	Centralized	Decentralized
Data base design effort	Very significant	Almost casual
Frequency of design changes	Low	High
Design change control	Strict	Lax
Design change effects	Profound	Trivial
Typical data volume	Large	Small
Application and data base design interdependence	Strong	Casual
Output requirements	Fixed	Variable
Predominant interrogation language	Cobol	Query-like

Figure 2. Static-Dynamic Application Characteristics

cations implemented with dynamic-relationship DBMS have almost the inverse set of problems and benefits as was described for the static DBMS above.

Data base integrity can be a significant problem with a dynamic-relationship DBMS. This is because the record types are related through field values which, in turn, are under user control. If the value in a parent record field is accidentally changed, its corresponding member records are lost with respect to that relationship. Members could also be potentially placed within a wrong relationship if the data value in the member was updated incorrectly.

Benchmark Results

DBMS benchmarks have shown that whenever there are production-oriented, DP-intensive interrogations, dynamic DBMS perform much more slowly than static DBMS. This is because dynamic-relationship DBMS, in addition to relationship processing via arrays of record keys (lists), often require the owner record to get the data value used to select, via secondary index search, the member records. The static-relationship DBMS merely follows a predefined pointer-based road map.

Other difficulties associated with applications of dynamic-relationship DBMS center around the implementation of multiple-record-type applications. It is the very independence of the record types that causes the problems.

Whenever there is a need for a multiple-record-type update, elaborate schemes must be implemented to ensure that all affected records are updated in unison. For a static DBMS, there is a command that specifically locks multiple record types. Compounding the multiple-record-type update lock problem, all well-designed applications must have coordinated backup and recovery and audit trails.

While all of these problems can be overcome by both good user code and sophisticated DBMS techniques, their existence can cause concern to the application's users if not dealt with effectively.

Of the benefits associated with applications implemented with dynamic-relationship DBMS, flexibility leads the list. Record types associated with a dynamic-relationship DBMS data base are often separate and independent physical files, so their loading and maintenance can be carried out without fear of interference.

In addition, these record types can often be processed sequentially — at great speeds — since all the records in the file are of the same type and format.

Finally, the greatest benefit of the dynamic-relationship DBMS is that the record types that together might traditionally operate under a static-relationship DBMS schema can enjoy some of the benefits derived from a centralized schema without having to be preloaded into a single static-relationship data base. For example, various and separate organizations have their applications operating separately throughout most of the year and only at year's end bring them together under the control of a virtual schema for corporatewide reporting.

Implementing the Static Application. The fundamental goals of a static data base can only be to: (a) create a data organization that mirrors the fundamental processes in an organization and (b) bring about maximum control over the updating and reporting of data in the data base. You cannot have goals other than these because the static DBMS will not permit them to be implemented — whether you like it or not!

Logical Data Base

The data base design process should take considerable time. You should become involved in a thorough requirements analysis process to determine the natural organizations of data. Looking to existing data processing systems will only throw you off the track. They were implemented to produce ad hoc reports. As a result, they had ad hoc data collections and ad hoc programs to transform the collection to the report. When another report was needed, another system was created. Finally, all the month-end systems were combined into one to reduce the multitude of file extracts, sorts and prints.

In short, these systems were set up to make data processing efficient, not to make the organization efficient. Data base is not about DP efficiencies, but about organization efficiencies.

Real Effort Begins

Once a thorough requirements analysis has been completed, the real data base design effort can begin. The techniques set out in Matt Flavin's book *Fundamental Concepts of Information Modeling* (Yourdon Press, 1981) are essential to the creation of a logically current and organizationally sound data base design.

The data base design process should

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produce three schemata. The first is the ideal schema. It sets out the blue-sky data base design. The second is a series of reality schemata. Each of those is drawn from the ideal schema and addresses a specific data base problem that has to be solved immediately. The combined scope of all the reality schemata should approximate that of the ideal schema. The third schema, the DBMS schema, is drawn from the reality schema and becomes what is actually required by the DBMS.

The products generated during the first two schemata are the same. These components, called the information model, are in essence specifications. At the ideal level, they apply to the organization as a whole. At the reality level, they apply either to a specific application or division within the organization. And at the DBMS level they apply both to a specific application and specific DBMS. The two higher schemata become implementation requirements that must be met for the data base to be correct.

The Physical Data Base

In a static DBMS, the data base storage structure and the data access strategy are normally very complex. Included in their design are different kinds of pointers, indexes, relationships, storage organizations, overflow tables, access techniques and the like. All of these things taken together give a static data base its speed. And, all these things taken together tightly bind static data bases to their application(s).

There are two other significant parts in the physical data base: the data loading subsystem and the data maintenance subsystem.

The data loading subsystem is a one-time-only application. Data integrity is founded in this subsystem. A static data base is supposed to be a nonredundant data store for a large family of applications. These formerly unrelated applications have data in different formats, lengths, code tables and so on.

All this data must be brought together into one common format. The data loading subsystem thus becomes the single melting pot for all this diverse data. Its design and implementation will take a great deal of time, and the conversion of existing and running applications to the single data base will take talent, skill and cleverness.

The second major subsystem is data maintenance. For a static data base, most data access is through pointers which lead owner to owner, owner to member and member to owner. This traversal process is very carefully designed to be efficient. Efficiency is required because many different applications, now involved with one data base, have all their update and retrieval transactions processed in the same time frame.

Interrogation Process

The majority of static data base interrogations are through host languages like Cobol or Fortran. This is for two reasons. First, the data base

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structure is so complex that a Cobol-like program is required to make best use of it. And second, a sophisticated query-like language, which would allow any kind of interrogation to be formulated, would operate too slowly.

A static data base derives its efficiency from its strict structure and preplanned road maps of pointers. Since a sophisticated query language could easily formulate queries counter to the design efficiency of a data base, most DBMS vendors have chosen not to produce these languages. They have, however, produced report writers and elementary query languages.

System Control

System control covers those activities that allow for the control of both the data base and the DBMS. Table 1 enumerates those that most affect static and dynamic applications. Most significant to the static application is reorganization. Since almost all programs are created with the data base structure in mind, changing it becomes a complicated job. The process of reorganization must be very carefully planned so that all the affected programs can be identified and researched for reprogramming effort. Certainly included is the data maintenance subsystem and the major reporting subsystems.

Whenever data is needed from multiple static data bases, the normal method of extraction is through host language interface languages. Most static DBMS do not have multiple data base facilities for either their query or report writers.

The most important fact to remember about the static application is that all aspects of its design should remain static for as long as possible. This means that you should spend as much time as possible on analysis and design. Cut short that effort and you will be performing many expensive data base reorganizations.

Implementing Dynamic DBMS

The fundamental goals of the data base are to: (a) create data bases from existing data processing files or single-purpose applications, and (b) allow the users maximum control over updating and reporting from their data bases. You cannot prevent users from doing these things, as these capabilities permeate the dynamic DBMS.

Logical Data Base

Data base design takes place very informally. A simple file-like data base can be created from an existing DP file by coding up the DDL and submitting it to the DBMS. For the dynamic DBMS, the terms "logical data base," "file" and "record type" mean almost the same. A complex data base, one in which there are several interrelated record types, can also be created. You create as many data bases as there are record types.

These interrconnections are exercised through the various interrogation languages. Some care must be taken to ensure that the connecting fields are of the same type, format, kind and value. Other than that, the data base design process is simple.

Most dynamic DBMS implement

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each logical data base as separate physical files. Some allow the combination of several of these logical data bases into one physical file. This is usually done to reduce JCL and to increase performance somewhat. When this is done, however, some of the flexibility of the independent file approach is lost.

Most of the dynamic DBMS allow for the creation of indexes, both primary (unique value) and secondary (nonunique value). They use primary indexes to locate records and secondary indexes to locate collections of records. These systems also often use the primary index of one record type as a secondary index of another as a way to implement an owner-member relationship. In lieu of index connections, the DBMS may merely require the user to state which two fields relate the record types. The DBMS takes care of all the processing.

The data loading subsystem is also informal. Dynamic DBMS often provide data loading utilities that transform a DP data file into a data base. If the transformation is simple, the utility works well. If the transformation cannot be handled, the user accomplishes data loading through a host language interface program.

Data maintenance is performed on a record-type by record-type basis by the individual users. Since each record type is independent of any other, little concern surfaces when other users update other record types. Updates for simple data bases are accomplished by one of the query-like languages. Complex updates are normally done through host languages.

Interrogation Process

Most of the dynamic DBMS have very well-developed query-like languages. Some of these languages are actually very sophisticated programming languages that allow multiple record-type access, automatic report formatting, code-table lookup, branching, looping, terminal prompting and the storage and invocation of prestored procedures.

Dynamic DBMS often have very poorly developed host language interfaces. The reason is simple: Few users ever need to use Cobol or Fortran to process data from the data base.

System Control

Reorganization is a simple process with a dynamic DBMS. A utility is invoked, the fields added or changed and the record type automatically reorganized. Whenever there is a new relationship between two record types, only one record type is changed by incorporating the new field. Following the addition of the field type, the user creates the update program to value this new relationship field. Once valued, the relationship is in place, waiting to be queried.

One drawback of a dynamic data base application occurs when you attempt multiple record type updates. The user or program that attempts the update must acquire locks over *all* the record types involved. This is difficult as a user is normally only allowed to open for update one record type at a time. You must first open a record type to lock it.

Construction of a multiple record-type audit trail is also difficult because the DBMS usually keeps the trail segregated by record type. As a result, the integrated audit trail can only be created through the update program. When it is needed, the only safe vehicle for data base updating is

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a host language program. All other languages should then be barred from update.

The most important fact to remember about a dynamic application is that the *user* is in control of data base definition, updating, reporting and many of the system control activities. The dynamic DBMS is a do-your-own-thing DBMS. That atmosphere is the only way possible for some application, but would be death to payroll, accounts payable/receivable and so on.

If your applications are predominately static, the dynamic-relationship DBMS is clearly the wrong choice. This is, however, usually determined only after the DBMS is acquired, installed and used for a period of time. The symptoms often are that your goals for DBMS fall short in accomplishment, or that you find another shop, using a static DBMS, is having much better success with its static applications.

This same story is true in its converse — when there is a static DBMS attempting to perform dynamic-relationship applications. In this case, the inappropriateness of the choice is known much earlier, because in static-relationship DBMS, applications cannot really begin to be implemented until the schema becomes static.

Clearly, certain applications are definitely static, others are dynamic and still others fall somewhere in both camps. In the case of the both-camps applications, you need to make a choice. If you choose a static DBMS, you gain performance at the expense of flexibility. If you choose a dynamic DBMS, you gain flexbility at the expense of performance. Fundamentally you need to decide which is more important to your application.

The Ideal DBMS

An ideal solution would be to have one DBMS that is both static and dynamic. It would, after submitting the DDL and certain operating characteristics, choose the manner (static/dynamic) under which a given relationship would be implemented. Since this facility is not available, users must choose one DBMS over another, or have multiple DBMS.

Multiple DBMS are, however, both costly to maintain and very difficult to support. They often have different data definition language forms, different data models, different host language interfaces and different query languages.

A comprehesive DBMS standard from the American National Standards Institute (Ansi) that would effectively support both static and dynamic applications would certainly help.

This article has addressed a critical aspect of DBMS: its relationship mechanism — that is, whether a DBMS is oriented toward static or dynamic relationships. It has not discussed the different kinds of interrogation languages; facilities for security, backup and recovery; logical and physical data base reorganization and so forth.

A lack of capability in any of these critical DBMS features cannot be overcome by a corresponding elegance in relationship specification and processing. Specific requirements for these support facilities flow naturally — and differently — from the fundamental goals defined in the data and their supporting relationships.

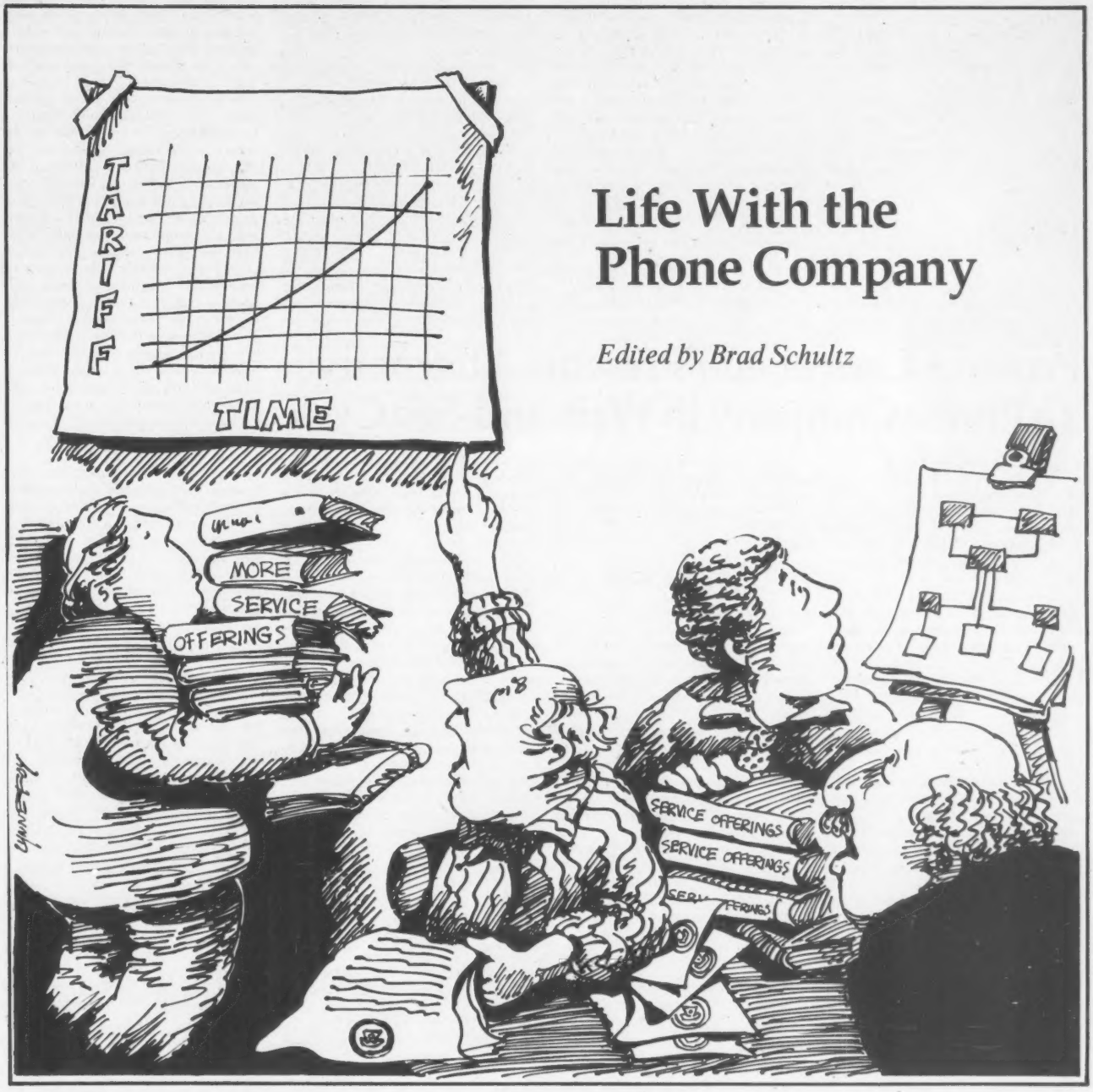
The ideal DBMS would be one in which *it* could make the decision of how to best implement an application — with static relationships, with dynamic relationships or with some of each. Today, however, there is no such beast, and so we must be content with a DBMS that is either predominately static or dynamic.

Michael M. Gorman is a senior staff consultant in the Data Base Group at Yourdon, Inc. Previously, Gorman was associated with Computer Sciences, MRI-Intel, and System Development Corp. He took a bachelor's degree from St. Bernard College and received his master's degree from the University of Maryland

Gorman wrote a data base administration course program for Yourdon which serves as a "survival guide" for the DBA. In addition to his work in industry and government, he has taught in the Graduate School at American University. He is currently secretary of the Ansi X3H2 DDL data base standards committee.

June 29, 1981

SPECIAL REPORT



Life With the Phone Company

Edited by Brad Schultz

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Programmer Keeps One Step Ahead of Bell

By Michael Avila
Special to CW

This article will explain how I, as a programmer/analyst responsible for a communications system, keep my organization a step ahead in its "life with the phone company."

But first let me provide some background on our data network at the Adventist Health System/Eastern and Middle America.

Although the network is not very large, we do a lot of communicating with our four remote Pertec Computer Corp. CMC XL40 computers. The host computer at our corporate headquarters is an NCR Corp. 8575 VRX.

The data communicated is critical to hospital functions and, therefore, the lives and well-being of many people.

We also have a Pertec CMC XL40 at the host site for data entry and communications backup. Non-Bell modems convert data using IBM's 3780 protocol over three foreign exchange (FX) telephone lines. A patch panel at the host site completes the link.

In planning for new phone company-related equipment, let your account representative know as soon as possible what you are considering. In the earliest stages of planning, there is no need to decide details, but a hint to the account representative of forthcoming actions will open verbal communications and probably ensure a place for you in his job calendar.

A simple written follow-up reminder will help to show the seriousness of your intentions. It should be sent about three months before you plan to test the new data network equipment.

As your plans take shape, discuss them with the telephone company representative, even if his advice seems unnecessary. Conflicts between your plans and policies of the phone company or the Federal Communications Commission (FCC) can be averted by your working together with the phone company or the FCC.

Let the representatives help design your plans before the formal work order is written and get written verification that you and they are planning for the same results. When it comes time to write the work order, be sure the request date for work to be completed *is* the test date. Allow a minimum of six weeks from the work-order date to the date you expect work to be completed.

Keep Rep Informed

Even after the work order has been drafted, keep your telephone company representative informed as you continue planning and as you start to implement your part of the plan. Any changes affecting the work order should be verbally brought to the attention of the telephone company immediately, followed up by dated, written correspondence.

By keeping the telephone company advised of what is being done as far ahead as possible, delays and conflicts will be avoided. I have also found that representatives can provide useful shortcuts. The biggest advantage of such a relationship for my organization has been that work orders were drafted faster and executed on time or prior to the needed date.

I like to keep at least one step ahead on everything I do, especially tasks

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Building Rapport

By Michael Avila
Special to CW

When AT&T and the local Bell personnel must work together, there seems to be no cooperation. I suggest, when this situation is unavoidable, that you have a member of your organization stay with the local Bell repair person and work as an interface between him and the repairman from AT&T.

On several occasions, I relayed messages between the two and was able to keep the repair steadily progressing. If you should consistently encounter long time periods between calling for repairs and when they call you back or when they start work, or until the work is completed, speak to your local telephone company representative.

He can help speed up repairs in most instances. Our representative provided us with the name and telephone number of the private line board supervisor. We call him only when really necessary, but he has been a help.

The only other contact I have with the telephone company is to

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Protocol Conversion Presents Alternative To Phone Company in Wait-and-See Cycle

By Brad Schultz
CW Staff

Protocol conversion is what many users will want before leaving a wait-and-see cycle as the local network market — loaded with alternatives to phone company offerings — takes shape.

It is commonplace in computing, when a new genre of products unfolds, for the user considering procurement to adopt a wait-and-see attitude.

While the first major entries in the genre may tempt painfully, the wise user knows that competition launched by subsequent entries can reduce prices in the genre, broaden the range of alternatives, bring important issues to the surface and allow vendors to erase any bugs first users discover.

Many data communications users must be cautiously waiting, as they see the new genre of local network systems unfold, until enough systems are installed and competitive models announced for rigorous procurement cycles to be possible.

Analysis

Last year, the Ethernet architecture became the chic topic for discussion when local networking panels assembled at professional conferences. Jointly developed by Digital Equipment Corp., Intel Corp. and Xerox Corp., Ethernet respectively represented the largest minicomputer vendor, a major chip maker and a giant office equipment manufacturer itching to tackle DP markets.

The Institute of Electrical and Electronics Engineers (IEEE) may inadvertently have set a trend by deciding not to decide on a dispute between two protocols for granting local-net access privileges: the carrier-sense multiple access (CSMA) method Ethernet features and token passing.

After all, protocol-converting hardware and software is predicated on vacillation among protocol users. And protocol conversion — such as offered by Intecom, Inc.'s newly revised Integrated Business Exchange Series 40 (IBX S/40) switching system [CW, June 1] — may be a ubiquitous property of future local net environments.

That view rests on the observation that so many protocols that local net users must choose from are now subjects of controversy, thus, many potential users presently find the whole situation too baffling or too chancy to buy anything. Protocol

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Inside

How will users adjust to changes now under way among common carriers?

Users will build their own phone companies. What do I mean by that? A resale common carrier is someone who buys from a carrier and resales to a different group. The Catholic Church has filed to become a resale common carrier. They have estimated that their telephone bill is $10 million to $12 million a month, which makes them the fourth or fifth largest telephone company AT&T serves.

Who will compete with AT&T?

Competition will come in different ways. Yesterday, we received a call from one of our clients, a major oil company. The client said to us, "We're thinking of building a nationwide switching and transmission system that we would build like a condominium. We would get 25 users together [in a Common Controlled Switching Arrangement (CCSA)]."

CCSA users in this country today include General Electric Co., General Motors Corp. and Chrysler Corp. The telephone company no longer has a monopoly on communications expertise.

We expect to see competition to AT&T coming from something we call the cable supercarrier consortium, which will challenge AT&T Long Lines specifically. The consortium will comprise one or more of the large cable operators — such as Westinghouse Corp.'s Teleprompter, Warner's, Amex, Time, Inc.'s ATC and Cox Cable.

We also see in this consortium a number of independent telephone companies — perhaps General Telephone & Electronics Corp., Continental and United Telephone. And we see one or more value-added networks — Tymnet, Inc., [GTE] Telenet, Inc. or Uninet.

We see one or more satellite communications companies — such as Satellite Business Systems, Western Union and GTE Satellite Corp. Finally, we see in the consortium a company like Sears Roebuck and Co. or General Electric or American Express Co.

The consortium will first go after the commercial DP market, then commercial voice, then what might be called residential DP. We think the consortium will never go after residential voice.

It's a new way to look at the world.

A lot of data communications users have small networks. Why should they worry about AT&T?

AT&T offers no help to them, but that's not necessarily something to worry about. Running a small network requires lots of people, lots of expertise, lots of data security equipment, plenty of fault detection gear and so on. The small user would like to build a small network congruent with AT&T nation wide.

The small user wants the network so congruent that an occasional operator can go from his terminal right through AT&T, back through his data base with appropriate safeguards, to do paperless buying, query response and inventory applications.

CW Photos by A. Dooley

"The user doesn't care if he goes satellite, packet switched, bushel basket or cans."

At the Office With Howard Anderson: The View From the Sidelines

How will both data communications users and Bell competition be affected if Bell is allowed to offer enhanced services and terminal equipment on a deregulated basis through a separate subsidiary?

They'd love it.

Why?

The user doesn't care if he goes satellite, packet switched, bushel basket or string between two tin cans. No one buys data communications. People are buying applications out there. If AT&T is going to make his job easier — give him more options, put him in more cities, lower his data communications cost — then why should the user care that one technical approach is implemented rather than another?

What are the prospects for developing alternatives to telephone company-provided local loops? Tymnet has asked the Federal Communications Commission (FCC) to offer wideband local exchange services to 45 or 50 cities. How much is this going to be happening and who's getting involved?

That's why this cable consortium becomes very important. An experiment is running now with SBS, Tymnet and Viacom Co. Meanwhile, Xerox Corp. wants to wire the world their way via Ethernet.

At the same time, you see AT&T wanting to wire the world on a star network, an approach with pluses and minuses. The pluses are that you can use fiber optics eventually. Among minuses is the fact that because of decibel loss, you can't have drops every 45 feet. So what you have to do is wire back to a PBX or supercontroller at every level.

Now, if a user is going to have to construct a new building, he's going to have to install both voice and data because he'd be stupid to wind up wiring the building twice.

We estimate it will cost him $1,000 per drop for every DP device installed. His telephone cost is going to cost about $550 per drop. None of this includes the cost of a PBX, so figure another $1,000 per line for that, half of which would cover installation. Is he going to want two sets of installers coming around?

Has Bell found a way to beat the packet-switched carriers at their own game?

With the exception of Tymnet, the packet-switched carriers aren't making much money. Users will start buying packet switchers themselves.

What does a packet-switched carrier do? It buys lines from Bell, adds packet switchers that generally reduce communications costs, and then sells access. Users can play the same game.

Howard Anderson — the energetic, marathon-running president of The Yankee Group, a Boston-based market research firm focused on DP and communications — is not one to mince words, according to interviewer Bruce Hoard, Computerworld's assistant communications editor.

A frequent speaker at data communications conferences, Anderson founded the Yankee Group in 1970 after a stint as vice-president of Shintron, Inc. He is a graduate of the University of Pennsylvania and Harvard Business School. When he spoke at this year's Communications Network Conference on how AT&T may restructure itself, the president of AT&T took notes.

Anderson was interviewed last month in his office.

How the Common Carriers Line Up

By Kenneth Sherman
Special to CW

With respect to communications, both voice and data, the organizations that provide the overwhelming majority of hardware, services and facilities are the common carriers.

The common carriers are under the jurisdiction of the Federal Communications Commission (FCC) when dealing with interstate traffic and the state public utilities commission when dealing with intrastate traffic. These regulatory agencies establish the standards, rules, tariffs and the like that determine what the carriers can offer and how much they can charge for those offerings.

The common carriers, on the other hand, must maintain a capability that meets a specific set of standards such that they can all interface with each other and therefore provide the capability for end users to obtain services, connections, interfacing hardware and such between any two points within the U.S. After interfacing with the international record carriers (IRC), who do the same thing for international traffic, the end users can then communicate anywhere around the world.

There are many different common carriers, of which the largest by far is AT&T. AT&T constitutes more than 80% of the common carrier capability in the U.S.

It operates in all of the contiguous 48 states either through total ownership of, or through a working relationship with, the local telephone company. Any telephone company in which AT&T has an interest is part of the Bell system.

The Bell system is comprised of approximately 23 different operating companies, of which the Southwest Bell Telephone Co. is the largest. After AT&T, the second largest telephone company is General Telephone and Electronics Corp., which provides approximately 10% of the common carrier capabilities in the U.S.

The remaining telephone companies, and there are approximately 2,000 of them, come in all different sizes, some as small as 100 telephones operated by a single family. Most of these non-Bell telephone companies are members of the U.S. Independent Telephone Association (Usita), which supports and helps them in regulatory proceedings and provides business assistance.

Any time a user has a requirement for common carrier services that involves more than one state, it is the responsibility of AT&T Long Lines Department to provide the total capability. This is done by interfacing all of the involved telephone companies, regardless of size, so that the user only has to interface with a single organization, AT&T Long Lines.

When there is more than one carrier involved within a particular state, the telephone company that handles the primary end of the service is usually the one responsible for integrating the service of all the telephone companies involved in providing the service within that state.

Oldest of All

The oldest of the common carriers is the Western Union Telegraph Co., which is now a subsidiary of the Western Union Corp.. The primary services offered by Western Union are public telegraph and money order, public switched teletype services (both Telex and TWX), computer-switched teletype and data terminal services and a wide variety of communications facilities primarily dealing with dedicated network facilities.

Western Union is also one of the IRCs tariffed to provide communications on an international basis.

The three largest IRCs are International Telephone and Telegraph World Communications, RCA Global Communications and Western Union International (which is now owned by Xerox Corp.).

These carriers are allowed to operate between the U.S. and other countries from specified gateway cities only. Some of these gateway cities are New York, Washington, D.C., Miami, New Orleans, Los Angeles and San Francisco.

With the expansion of packet- type services in the future, if existing IRCs do not handle that service, in all probability a new IRC will be established that will specialize in packet capabilities. The services provided by IRCs cover the full range of telephone, telegraph, international Telex, radiogram and different types of data transmissions at a variety of speeds in the international market.

One of the long-term results of the problems that have arisen because of the interfacing of different common carriers for different services has been the emergence of a new group of carriers known as specialized common carriers.

Because the transmission of data over facilities that were built primarily for voice communications has presented many problems to the user over the years, and because of the new laws involving the interconnection of noncarrier-built telephone and special data facilities, several independent operators have applied for and have been granted common carrier status. The primary offerings of most of these carriers are facilities and services that are more tailored to the requirements of organizations that must transmit high volumes of data.

There are two different groups that make up the specialized common carriers. They are the carriers that build and/or lease facilities and in turn sublease those services to the end user, and then there are the specialized common carriers that build and/or lease facilities, add some type of service to those facilities to increase the value of it and then sublease the entire service to the end user.

VAN Carriers

The latter type of organization is called a value-added network carrier (VAN) and is most often the organization that offers time-sharing services.

The majority of the specialized common carriers (SCC) offer a service that is primarily leased line facilities on an interstate basis. The SCC will interconnect with the local telephone company at each end of the leased line in order to provide a local loop that will then connect the end users to each other. In many cases the techniques these SCC use is the same as the Bell system, and in some cases the services provided may be in reality excess capacity on facilities the company uses for its own in-house communications.

Many companies such as Southern Pacific Communications Co., New York Penn Microwave Corp. and Microwave Communications of America, Inc. have facilities they originally built for their own in-house use. When the in-house use did not require the full capabilities of the existing network, these companies applied for and were granted tariffs to sell or lease services utilizing that excess capacity and must therefore be defined as common carriers.

As common carriers they are required to meet the same regulatory standards as the telephone companies, but are allowed to file for different tariffs, which means mostly a different pricing structure. If the technical standards they are designed to meet are different from those provided by the telephone companies, this must be spelled out in the tariff. But in any case, they must be compatible with the standard telephone company interfaces at the connection point to those telephone companies from their own dedicated network segments.

Time-Sharing Houses

In the case of VANs, the oldest of them are the time-sharing houses such as Tymshare, Inc., University Computing Co., Boeing Computer Services Co., National CSS Inc. and others. The value added on the network was to provide computing capability and data base storage on a time-shared basis utilizing a common carrier network.

Because the time-share operator was performing computations on data being transmitted from a remote location over a common carrier network, the operation was determined to be a data processing operation and not a communications function; therefore the time-sharing houses were not required to obtain common carrier status.

However, if the computer to which the terminals were connected was performing switching-type functions only, the organization would become subject to regulations as a common carrier. It is interesting to note that some of the VANs also provide switching services and are at present involved in legal maneuvering with the FCC because they provide a combination of value-added functions and switching, which means they are therefore in the gray area of whether they should be tariffed or not.

For those services where there is a question, it may be provided; but a portion of the revenue must be kept in an escrow-type account so that if it is eventually ruled against them, the VANs will have to refund some portion of the revenue back to the users who paid for the unauthorized service. With the rate of progress to date it may be many years before this question is finally resolved.

To compound the confusion of carrier types a new type of value-added network operator has come into being in the last few years. These are the packet network operators, with the two largest being Telenet Communications Corp. (owned by GTE) and Tymnet, Inc. (a division of Tymshare). In addition, AT&T has announced a packet service that is expected to begin in the mid-1980s time frame.

ITT is one of the organizations in the process of installing a packet network. Initially it will be between New York and Houston, which will serve the southeastern U.S.

Carriers Offer Multitude of User Services

By Kenneth Sherman
Special to CW

The common carriers provide hardware, physical facilities such as communications lines and transmission services.

The services offered by the common carriers fall into three separate categories. They are voice, data and others such as facsimile, television and radio.

The services are provided over either a private line, which the user contracts for on a monthly basis, or a dial-up line, which uses the common carrier circuit-switching facilities to establish a circuit each time the user wants to communicate between specific transmitting and receiving locations.

The service may be offered with equipment leased from common carrier or third-party leased equipment or with user-owned equipment, except that when a user provides his own interface equipment, either a special interface device called a connecting arrangement must be provided by the phone company or the user's device must be certificated.

Certification was a recent Federal Communications Commission ruling that stated that if the user's equipment meets the interface requirements for connection to a voice-grade line it can be connected directly to that line. Both data and voice capabilities can be utilized over either the dedicated or dial-up facilities.

DDD Facilities

The dial-up facilities are known as Direct Distance Dial (DDD) facilities. These dedicated and dial network facilities are by far the most common services offered by the common carriers.

Another widely used service that can be used for either voice, data or both is Wide-Area Telecommunications Service (Wats). Wats is a bulk-type service in which the user pays a fixed rate for a specified maximum number of calls on a line with a specified maximum time utilization on a monthly basis.

All calls made on a Wats line are specifically logged for quantity and length so the user can see the specific utilization of that line. The maximum quantity at this time is 240 hours of utilization per month, which is called Business Day Wats.

Any utilization beyond the 240 hours is billed as an overtime charge. At the same time, there is a limitation of 14,400 calls that have to be made on a monthly basis. This averages out to one minute per call for 240 hours.

The reason for this limitation is that when users started making computer-to-computer calls, the average length of a call was between 10 and 20 seconds and, in each case, the call was routed over the DDD facilities, utilizing all of the switching network.

In order to prevent this heavy load being generated from computerized calling, the telephone company put a maximum of 14,400 calls per business date month, beyond which there is a heavy overtime charge per call. Wats is also tariffed on a more limited basis, such as a specific quantity of hours per month.

Wats comes in two forms: outbound Wats and inbound Wats. Outbound Wats has a geographic limitation on the distance a call can be made. There are five bands of Wats, in-which band 5 covers the entire continental U.S.

Band 1 usually includes the states contiguous to the state in which the caller is located. Band 2 includes the states contiguous to the band 1 states. Bands 3, 4 and 5 eventually cover all of the states.

In order to determine which band classification is applicable in a particular environment, the user should contact the local telephone company, which can provide the necessary identification of which remote cities are in which Wats bands for each specific user location from which calls will be made.

The second type of Wats line, inbound Wats, is sometimes called an 800 number. When a caller dials an 800 number, the call is charged to the receiving party. This service is normally utilized when the caller will be providing some business function, in return for which he does not pay for the call.

There is also a measured Wats ser-

(Continued on SR/6)

In the articles here and on Special Report/4, consultant Kenneth Sherman provides definitions and explanations for many terms applied to carriers and carrier offerings in the world of data communications.

The articles were adapted from a chapter of Sherman's Data Communications: A Users Guide, *published this year by Reston Publishing Co., Inc., 11480 Sunset Hills Road, Reston, Va. 22090. Sherman is president of Infocomm, Inc. in Villa Park, Calif.*

Analyst Stays Step Ahead Of Telephone Company

(Continued from SR/2)

that involve people I (or those in my organization) cannot control. The telephone company itself made me a believer that it was one vendor that would tolerate no exceptions to its policy. Extra effort was needed for me to always be at least one step ahead of them.

The project that brought this to my attention was our corporate headquarters move. Although the move was less than one mile, we had three FX phone lines that had to be transported to the new site.

Trying to keep a step ahead, we requested that a single line be installed to run between the old location and the new location in addition to running the new FX lines from the local central office to our new location. That would form a triangle that would allow us to use the new lines in a production mode before the actual move.

A set of switches would allow us to use the new or old lines at our option. Also, in case the new lines did not work, we could switch to the old and be running with no problems (see chart).

We made arrangements with the computer vendor to have a mainframe at the new location, so we would be able to press STOP on the mainframe at the old location, carry all disk packs to the new location, press START there and be up and running with a minimum of downtime.

Naturally it was more involved, but that was the basic theory.

My responsibility was to be sure the FX lines were installed correctly and that test mode data could be transmitted from the new location to our remote sites. The telephone company was given a date for the work to be completed — more than a month from the date the work order was filed. (I was told at least three weeks' notice was required.)

Line Drop

About two weeks prior to the requested completion date, the line levels suddenly dropped on two of the three FX phone lines. One line was so bad the dial tone could not be heard. (AT&T Long Lines assured us there was an operating dial tone.)

The trouble was traced to movable bridges (for our switches) in the central office. I was told the triangle of lines would have to be redesigned.

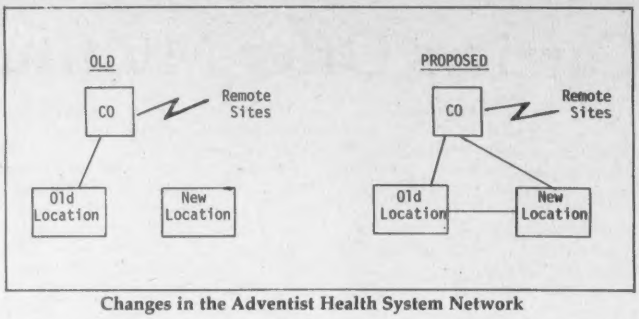
Needless to say, the completion date was not met. Fortunately, the manager in charge of the move for my organization was keeping a step ahead and built in extra time. Do not expect telephone equipment to be installed one day and in production mode the day after.

Always Accessible

Always have someone accessible to the telephone company installer so the work order will be executed faster and more easily. As the installation is nearing completion, have a representative of your organization stay with the installer and ask questions about what was done and any problems that were encountered. When the installer is done, ask him to stay while preliminary testing is done.

You can keep one step ahead in daily operations by asking the operators at least once a day how communications are progressing. You should take random level checks, a look at the bit error rate and just pick up the phone to listen for noise. Many times you can get a hint that trouble is on its way by watching for patterns and changing line characteristics.

Avila's organization, the Adventist Health System/Eastern and Middle America, is headquartered in Shawnee Mission, Kan.



Changes in the Adventist Health System Network

Liaisons Needed For Net Building

(Continued from SR/2)

ask for information. Most of the information I receive is correct, but sometimes I have to call several people and put the bits and pieces together. As one example, I received a letter from Bell about satellite communications. [*Bell has told Wide-Area Telecommunication and Message Toll Service customers to expect propagation delays and echo problems with half-duplex modems as it shunts a large portion of long-haul traffic to orbiting satellites. — Ed.*]

Neither the local Bell company, nor AT&T could provide specific details about the transition.

I finally got some answers from a coworker's brother, who is employed by a large corporation unaffiliated with us.

Users Waiting on Networks

(Continued from SR/2)

could resolve matters by allowing bets to be hedged.

The user of a local net system featuring such capabilities could try various alternative protocols, successively and simultaneously, at tolerable levels of jeopardy to DP operations.

Last year, the world's largest engineering society, the IEEE, seemed ready to adopt a local net architecture standard much like Ethernet [CW, Aug. 25]. Developers of Ethernet rivals — such as Zilog, Inc. with its Z-Net — had to wonder whether they were barking up the wrong tree.

Not long ago, Zilog announced Z-Net eventually will have an Ethernet gateway [CW, March 2]. A number of vendors, such as Nixdorf Corp., assured users their forthcoming systems would fit Ethernet somehow.

But the pertinent IEEE committee decided not to decide whether CSMA was a method of granting local net access privileges superior to token passing, an alternative favored by scientists at England's Cambridge University and by various U.S. groups. Much like those who drafted platforms for the two major American political parties earlier that year, the IEEE committee saw virtue in declaring that two incompatible views ought to be supported simultaneously.

The committee endorsed both CSMA and token passing.

Other differences between the emerging IEEE standard 802 and Ethernet were publicized, but by then the Ethernet bandwagon had rolled to the point where experts wondered why the IEEE effort was worth much attention. Some pointed to IBM, which has released many protocols that became more widely implemented and emulated than so-called world standards those protocols will never fit.

Real Standard?

Could Ethernet be the real standard, trivializing whatever IEEE produces? Many experts seem to think so. In recent months, Xerox has unveiled several Ethernet devices, more or less launching a new product genre and therefore a period of wait-and-see for the hefty chunk of the data communications community expected to establish local networks within the next few years.

Meanwhile, New York-based Logica, Inc., whose English parent grew enraptured with Cambridge University's token passing, has begun marketing a local net system as an alternative to CSMA-based models [CW, March 23]. With protocol conversion, Intecom means to sell a lot of IBX/S40s to local net users whichever way the wind blows on contests like Systems Network Architecture (SNA) vs. the X.25 protocol, CSMA vs. token passing and the Bell Advanced Communications Service vs. the world.

Common Carrier Service Areas

(Continued from SR/5)

vice consisting of a flat rate for a specified amount of time the user has contracted for, and if the calling time exceeds that time the user will be charged with overtime rates.

Data transmission can take place on any voice-grade facility for those companies that already have Wats lines.If those lines are not utilized for voice to their full availability, they can be used very efficiently for data communications, getting what is, in effect, free transmission time.

Along with this combined capability is the availability of hardware devices that can monitor and measure Wats utilization. These devices will identify the calling extension, called location and duration of call on any Wats line so that the communications manager can determine whether an effective utilization of his facilities is being made.

Based on this information, if there are times of the day when it would be desirable to set aside specific periods for either voice or data communications, the Wats facility could be utilized to its maximum benefit.

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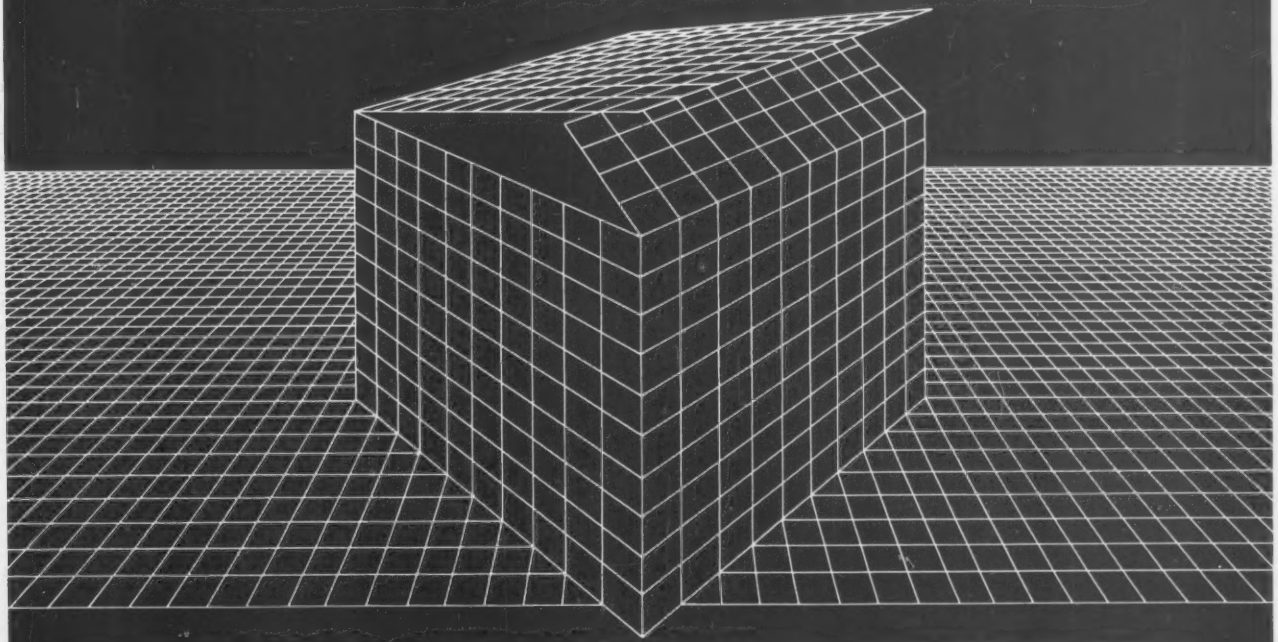

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Technology Melds Vendors' Concerns

DP, Communications: Where Their Paths Cross

By Gerald W. Brock
Special to CW

The fundamental components of a communications system are line-haul equipment, switching systems, multiplexing systems and terminal equipment. The advent of satellite communications has affected only marketing of the line-haul component, while progress in computer technology has threatened vendors of the other three components.

The technological progress brought computer firms into the communications industry and caused AT&T to adopt the new technology for its communications operations and to expand its operations into the previous domain of computer processing.

Because computer systems incorporate communications functions, computer technology can displace traditional communications technology for switching and multiplexing and, to a lesser extent, for terminal equipment. But major differences in design goals of the computer and communications industries slow the displacement process.

For decades, these design differences have allowed each technology to exist independently and be sold under wide price ranges. But digital computer technology has dropped in cost more rapidly than analog voice technology and led to incorporation of digital components in the voice network.

The most significant difference in the design goals of computing and communications has been that computers are designed to transmit data and telephone systems are designed to transmit voice. Data takes on discrete values, so switching and multiplexing activities in computers are designed to process digital signals. Voice, on the other hand, takes on infinite gradations.

Consequently, the telephone system handles signals in analog form (varying continuously), and its equipment is designed to manage analog signals. Switching and multiplexing technology for control of analog signals differs greatly from that for control of digital signals.

Another difference has been that data transmission requires much more accuracy than voice transmission. With the former, results can alter significantly with improper transmission of a single bit. With voice, whole syllables may be blotted out by transmission errors without destroying intelligibility.

A third difference between the design goals of computer and communications technologies relates to problems of entire system failure. In early stand-alone computers, an entire system failure simply meant the loss of computer capability for a time and was often less serious than undetected transmission of faulty data.

Entire system failure within a public telephone network eliminates service to many people — a situation generally more harmful than serious errors in transmission of individual

(Continued on SR/14)

These three articles are adapted from a section in Chapter 10 of Gerald W. Brock's new book, The Telecommunications Industry: The Dynamics of Market Structure, *with permission of the publisher, Harvard University Press. Available for $25, the book discusses the role telephone companies have played in data communications and background on regulation of telecommunications since the 19th century.*

Brock is president of Brock Economic Research, Inc., an economic consulting firm.

FCC Decision Starts Decontrol

By Gerald W. Brock
Special to CW

In April 1980, the Federal Communications Commission (FCC) issued a final decision on the Second Computer Inquiry, clearly moving toward deregulation of the common carriers' involvement in data communications.

Only basic transmission would remain regulated. Transmission services enhanced with computer processing could only be sold by AT&T or General Telephone and Electronics Corp. (GTE) through separate subsidiaries that purchased basic transmission capacity on a tariff basis. Smaller telephone companies were allowed greater freedom in structuring enhanced services and terminal equipment offers than were AT&T and GTE.

If implemented, this final FCC decision will be an extremely significant event in the telecommunications industry.

The decision cut across many established regulatory patterns. These included the 1956 Consent Decree's restriction of AT&T to regulated services as well as treatment of terminal equipment under "separations formulas."

To build incentive for new firms to enter telecommunications, regulators devised separations formulas for allocating some costs of local telephone service to long distance. This practice, begun prior to the advent of widespread data communications, led to rising rates for use of local exchanges, falling long-distance rates and a situation where a common carrier's long-distance revenues began subsidizing local exchange operations.

A long-distance call placed from one local telephone company to an-

(Continued on SR/10)

Computer Inquiry II Began Resale Probe

By Gerald W. Brock
Special to CW

Near the beginning of its Second Computer Inquiry, the Federal Communications Commission (FCC) completed an investigation of the telephone carriers' resale restrictions.

The carriers sold services at prices considered too low for potential competitors to match. This discriminatory pricing was the means the carriers chose to compensate for resale restrictions that allowed services the carriers sold to favored customers to be resold by the latter to users that might otherwise be the carriers' customers.

Since its creation, the FCC had enforced such restrictive provisions, but the affected community never had a chance to evaluate and approve them. The Second Inquiry grew out of a desire by certain companies to lease lines from AT&T and to "add value" to those lines through computer capabilities, yielding a new, value-added communications service.

The commission ruled that the resale and sharing restrictions were unlawful discrimination and should be removed for all services except the Message Toll Service (MTS) and Wide-Area Telecommunications service (Wats).

The fundamental legal principle underlying the decision was a 1911 Supreme Court decision that prohibited the railroads from refusing service to freight forwarders who purchased railroad service in bulk and resold it to smaller shippers.

In the resale decision, the FCC distinguished between resale and sharing. Resale carriers were subject to regulation, but with a policy of fairly free entry. Entrants would have to

(Continued on SR/10)

University Nixes Private Line for Local Net

By David L. Nordlund
Special to CW

While many of us want to be in the forefront of local networking, we cannot afford to gamble either performance or dollars, so older and tested approaches such as renting private lines from telephone companies appear more attractive.

The phrase 'local networking' usually implies sophisticated coaxial or fiber-optic communications systems and often is associated with automated office concepts.

Many users can install their own cables, but others find it more convenient to rent twisted-pair lines from a phone company. Either way, successful local networking is attainable if the correct type of line is acquired.

A conventional private line has limited bandwidth and draws 48V current. At the University of Kansas, we bypassed a private line in favor of an "unloaded line" for use with short-haul modems.

Operating Speeds

This allowed us to operate at speeds up to 19.2K bit/sec. We used this speed to run protocols that allow multithread operation, where a single line serves many terminals or batch job streams.

Short-haul modems operate over short distances on dedicated wires. Their advantages over long-haul modems are increased speed and much lower cost.

Short-haul sets run at up to 19.2K bit/sec over simple twisted-pair lines over distances of two to three miles. Most can be switched to slower speeds for longer distances.

RS-232C Interface

Computers and terminals find the RS-232C interface identical to conventional modems from Bell or other vendors. To meet the interface, users installing their own wires require two pairs (one pair for transmission, the other for reception) in the 22 to 26 gauge range. No shielding is required unless wires are to run through areas with much electrical noise.

In developing a local network, we found it more convenient, in many cases, to rent lines from Bell than to install our own.

The Bell representative will probably not understand what you want when you first ask. Lines for a local net may need to meet the following specifications:

- Lines must not have loading coils, commonly installed to smoothe frequency response for voice applications, because they limit upper frequency response of the lines.
- Not all short-haul modems require dc continuity, which ensures continuous wiring between a link's ends, but some do.
- Short-haul modems may require twisted-pair (four-wire) lines.
- Lines may terminate in a common square junction box with four screws. Ask Bell to put both pairs in the same junction box. The phone company may be willing to install a four-prong plug or one of the new modular connectors. They will insist on installing two small protection circuits, one on each pair.
- Bell's standard installation procedure is to reverse the two pairs somewhere between one end and the other. The red-green pair at one end will be connected to the black-yellow pair at the other. If the phone company installs two termination boxes, one should be marked transit and the other receive.

Rental Categories

Bell will price line rentals according to the following three user categories: same building, same premises; different building, same premises; different building, different premises. Monthly costs run from $20 to $40.

Ask your Bell marketing representative for Bell System Technical Reference PUB 41028 to get details.

All is not sweetness and light with Bell, however. We found several problems to solve before initiating normal operation:

- About half the initial set of eight lines ordered had high noise signals, preventing clean operation of modems. Ask for noise measurements on all lines before accepting the installation. In general, all noise should stay below 60 dbV.
- Leftover loading coils can cause strange aberrations in frequency response. We had two circuits with a significant dip in response at 2,000 Hz. Bell tends to claim that no frequency response is specified, but PUB 41028 does give minimums.

In general, there should be a uniform change in line loss by frequency from -15 db at 1,000 Hz to -30 db at 10,000 Hz, depending on line length.

- Bell does not guarantee line polarity maintenance. Red may not be connected to red. Some asynchronous short-haul modems are sensitive to line polarity, so you may need to try reversing wires in one pair or the other to resolve problems.

After all lines and modems are operating, you are ready to use the local network. Many vendors have a line protocol capable of handling more than a single type of communications. IBM's 2770 and Honeywell, Inc.'s MMI protocols are examples.

Nordlund is assistant director, Academic Computer Center, University of Kansas, P.O. Drawer 2007, Lawrence, Kan. 66045.

FCC Decision Cuts Across Regulatory Patterns

(Continued from SR/8)

other would go through the local lines of the first company, the long-distance lines of AT&T and then to the receiving company's local lines.

The originating company would bill the customer for the call and the revenue would be divided between the local company and AT&T. Separations only applied to dial-up calls, not to private-line service which provided a long-distance circuit for a single customer's exclusive use.

The separations formulas were worked out in conferences of the telephone companies in cooperation with state regulatory agencies. The general principle used was that costs should be allocated according to use.

AT&T's View

From AT&T's viewpoint, much of the separations money was simply internal accounting transactions between its Long Lines Department and operating companies, with a small percentage of the money leaving AT&T control to pay independents for use of their local wires.

In April 1980, the FCC declared that AT&T would not be barred from the newly deregulated areas (terminal equipment and all enhanced communications services), but only the Justice Department and the court can make a definitive interpretation of the decree. Thus it is possible that the decision would bar AT&T from large areas of communications services if a strict interpretation of the consent decree is followed.

The Second Computer Inquiry left the regulatory boundary between computer and communications services vague and subject to individual interpretation. AT&T offered products combining communications and data processing as regulated communications services. DP companies offered similar services as unregulated DP services.

For example, PBXs are traditional parts of the regulated communications service. When AT&T introduced its Dimension PBX line, which was based on digital computer technology, it also gained a capability to perform standard DP functions that was absent in the previous electromechanical PBX systems. AT&T gave the Dimension a hotel/motel feature that allowed it to perform certain accounting functions previously handled by separate computers.

Similarly, AT&T had long supplied teletypewriter terminals under tariff as part of its communications services. When considerable computer "intelligence" was built into an upgrade of the traditional teletypewriter line, it became competitive with intelligent terminals offered by unregulated computer companies. AT&T also announced an enhanced communications system that would allow links between otherwise incompatible terminals and perform functions ordinarily done by private computers on other networks.

While AT&T moved into traditional computer functions, IBM and Xerox Corp. made plans to offer direct communications competition based on their computer expertise. The combination of satellite technology for line-haul and computer technology for switching, multiplexing and terminal equipment offered the possibility of setting up a complete communications system separate from the common carriers' traditional analog communications facilities.

Through a subsidiary, and in a joint venture with Comsat General Corp. and Aetna Casualty & Surety Co., IBM's approach to providing an alternative to the analog links of common carriers was Satellite Business Systems' (SBS) all-digital service, bounced off satellites in geosynchronous orbit. SBS began the service early this year [CW, March 16].

Xerox, on the other hand, proposed the Xerox Telecommunications Network (Xten), which would entail a radio-based local distribution network with transmission in the 10GHz range, rather than the SBS approach of satellite links in the 12GHz range that compels customers to have dish antennae. But Xerox abandoned the Xten project last month [CW, May 25] — reportedly for financial, not technological, reasons.

Resale Restrictions Probed

(Continued from SR/8)

show they were legally, technically and financially qualified to offer the proposed service; but the FCC would assume the services were in the public interest. No issues of economic harm to existing carriers would be considered.

Further, rate regulation and exit regulation would be imposed. Sharing arrangements would not come under regulation, whether performed in a pure sharing mode or via a nonprofit intermediary.

The FCC decision left considerable room for the two categories of resale and sharing to overlap and was vigorously opposed by AT&T, which thereby gained several delays of implementation. Finally, an appeals court ruled in favor of the FCC and the proceeding was completed in 1978 when the Supreme Court refused to hear AT&T's appeal of that ruling.

In July 1979, the FCC established four categories of service: basic voice, basic nonvoice, enhanced nonvoice and data processing. The first two services were defined as fundamental communications services in which a message has the same form when delivered to the carrier as when received by the final customer. Basic voice and basic nonvoice thus would be provided by regulated common carriers in the traditional manner.

The third service category (enhanced nonvoice) comprised all services that were largely communications, but also included data processing. The FCC permitted carriers to provide enhanced nonvoice services, but stipulated that *underlying carriers* (owners of basic communications facilities) could only do so through a subsidiary separate from the organization that sells basic services.

As for the fourth category, the commission decided that the same entities engaged in marketing enhanced nonvoice services under regulation could also market DP services without regulation.

Thus, underlying carriers — such as the AT&T phone companies — were prohibited from directly selling terminals with DP capabilities. Such terminals could only be offered, the FCC decided, by the traditional computer industry (without FCC oversight), or on a regulated basis by an enhanced nonvoice company or on a regulated basis by a separate subsidiary of an underlying carrier — such as AT&T's Western Electric Co. subsidiary.

Expanded Scope

This tentative decision of July 1979 expanded the potential scope of regulation into many services that previously were considered pure DP. For example, a standard procedure of time-sharing computer service companies was to lease private-line circuits from the carriers to establish a data communications network, binding remote locations. Customers could then access the central computer via a local call to the local office and over the DP company's leased line to the central computer.

This was considered DP service, not resale of communications service.

The rules laid down two years ago left open the possibility that *DP service could come under regulation if the central computer simply sent messages to the customer rather than extensively processed the data in the messages.*

The vagueness, complexity and scope for regulatory expansion contained in the proposed rules provoked widespread dissatisfaction. So the FCC's final decision, issued in April 1980, was a substantial departure from the tentative decision of July 1979.

All terminal equipment (including basic telephones) are to be deregulated by March 1982, the commission announced. After that time, telephone sets may only be provided by AT&T or General Telephone and Electronics Corp. (the nation's second largest common carrier) through a separate unregulated subsidiary, not as part of basic telephone service.

Only that basic service is to remain regulated.

Allows Simpler Earth Stations

TDMA Boosts Efficiency of Satellite Use

By Joseph Deal
Special to CW

Time Division Multiple Access (TDMA) is a key technology in the future of satellite communications, on which telephone companies and other carriers are coming to depend.

The advantages of TDMA include more efficient use of satellite capacity than with the traditionally used Frequency Division Multiple Access (FDMA) technique. It also provides for simpler, more flexible earth station configurations; is directly compatible with digital terrestrial transmissions; allows the use of advanced digital signal processing (including forward error correction, digital speech interpolation and data encryption); and is easy to operate and maintain.

In TDMA transmissions, all earth stations accessing a satellite transponder share this transponder in time by transmitting their traffic in bursts. These bursts of carrier signals are transmitted through the transponder in sequence and do not overlap. A pictorial representation of the TDMA concept is shown in Figure 1.

Bursts of carrier signals are interleaved through the satellite and retransmitted to all earth stations. In the U.S., a number of common carriers have made the transition from FDMA to TDMA.

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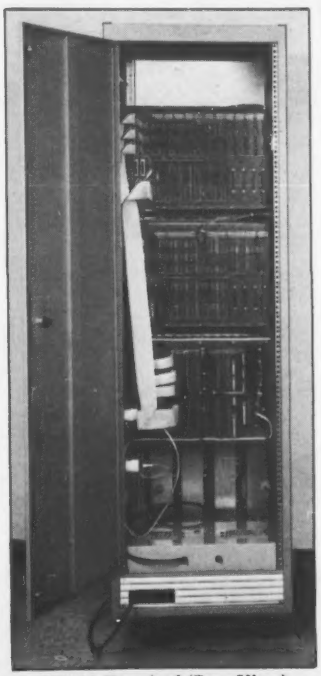

TDMA Terminal (Rear View)

American Satellite Corp. was the first to use TDMA in commercial service with TDMA earth stations in New York, Los Angeles, San Francisco and Dallas. Another U.S. common carrier, RCA American Communications, Inc., has scheduled TDMA operation in Washington, D.C., and San Francisco to begin in the middle of this year.

In a typical arrangement for TDMA operation, the central office contains the voice digitizing equipment, multiplexing equipment and half of the digital radio link (typically running at 78M bit/sec in the 6- or 11GHz band).

The remote earth station contains the opposite half of the digital link and demultiplexing equipment to extract the individual T1 channels. These T1 channels form the basic input to the TDMA terminal, which operates at a burst rate of 62M bit/sec via a 36MHz satellite transponder.

The TDMA terminal can accommodate 40 T1-channels at this rate. A block diagram of the system configuration is shown in Figure 2. The

(Continued on SR/16)

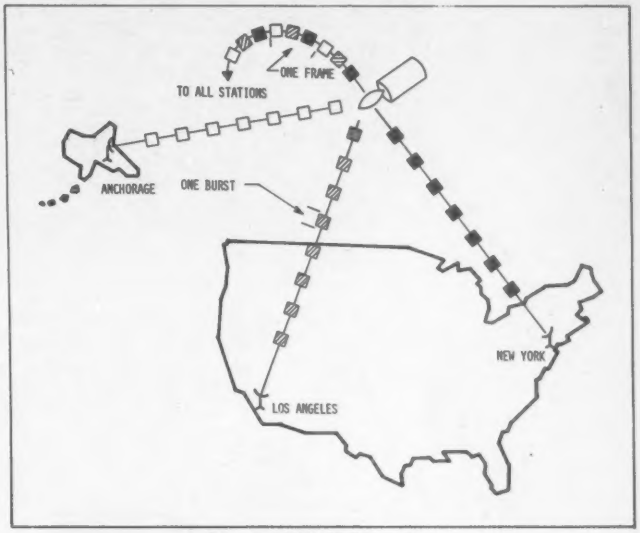

Figure 1: TDMA Concept

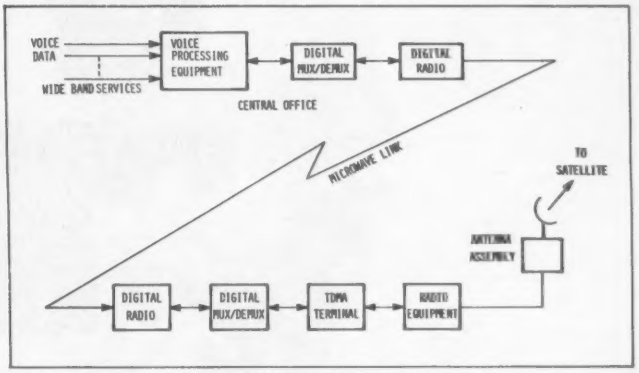

Figure 2: System Configuration

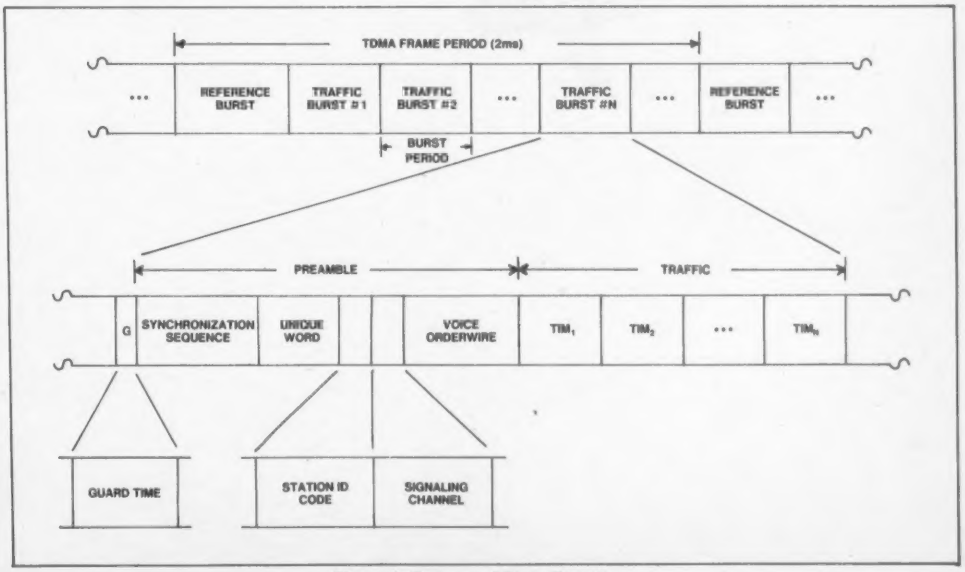

Figure 3: Frame and Burst Structure

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The knowledge business

'Do You Ever Wonder If They Use Any of This Stuff?'

DP, Communications Paths Cross, Distinctions Muddle

(Continued from SR/8)

conversations. But this third difference between design goals of computing and communications is evaporating with the proliferation of time-shared data networks that take on a public nature similar to the telephone network.

Increased use of computer technology in the telephone system and increased use of telephone lines in computer systems brought the computer and communications industries into close interaction. (Substitution of computer for communications technology began in 1964 when AT&T installed a special-purpose computer to control a large central office switching system.)

After five years of consideration, the Federal Communications Commission (FCC) promulgated its computer rules, limiting phone company penetration, in 1971. Services were divided into four categories: data processing, hybrid data processing, hybrid communications and communications.

Limited Regulations

FCC decided to regulate services primarily used to communicate information, but not to regulate services primarily used to process information. Regulated common carriers were prohibited from providing DP service except through separate subsidiaries.

AT&T could not provide DP service at all, the commission ruled, because its 1956 Consent Decree with the Justice Department restricted the largest common carrier.

The 1971 rules decided little. They left an arbitrary line between DP and communications that was not based on underlying technological and economic forces.

When Upkeep Tops Purchase Costs

Net User Finds Conserving Energy Pays Off

By Brad Schultz
CW Staff

BEDMINSTER, N.J. — DP centers within AT&T's Long Lines Division have worked to cut energy consumption in data communications, according to a Long Lines engineer here with advice on how other network users can reduce demand for electricity.

Many data communications devices cost less to buy than to power over their lifetimes [CW, Feb. 16]. And the cost of electricity is likely to rise sharply — perhaps more sharply than carrier tariffs — over the lifetimes of devices installed this year.

According to one study, every penny increase in electric utility rates means a user must spend $8.76 more that year on power drawn by a continuously operated 100W device. (Modems are commonly run continuously, while terminals tend to rest a few hours daily.)

Given the number of devices that run in typical data networks, a penny hike in the price of a kilowatt can mean a $5,000 to $10,000 jump in a network's annual operating cost.

Nevertheless, David Shollenberger — who supervises data systems design at Long Lines — has observed that many DP managers resist energy conservation programs within their organizations. For the most part, he told *Computerworld*, these managers feel that turning off a piece of DP equipment is "looking for trouble."

Good Results

The Long Lines conservation effort went over fairly well, Shollenberger stated. The effort reportedly reduced availability of some devices, but also increased component reliability in the AT&T division's internal data network.

In considering an energy conservation program, DP management must weigh the value of system availability against the value of reliability, Shollenberger pointed out, and consider the impact rising energy costs will have on the DP budget at a time when other factors affecting the organization may lead top management to tighten allocations to DP.

In the past, top management has not put the DP department "under the gun" to reduce energy consumption, Shollenberger said. "Therefore, no real incentive exists for the DP manager to take a few early risks in order to reap long-term energy savings."

Many DPers are apathetic about energy conservation, he added. "Our employees [at Long Lines] were not 'energy conscious' until specific energy wastes were brought to their attention.

"Reminders were used to turn off lights when not in use, energy costs were brought to their attention and specific energy programs were developed for each of our data centers," Shollenberger reported.

National temperature guidelines do not necessarily apply to computer rooms, the systems design supervisor maintained. "An exemption can be obtained to run computer rooms at lower than the federal guideline of 78° F. This contributes to the slow start of conservation efforts in DP."

Shollenberger said users that require greater efficiencies in power equipment such as uninterruptible power supplies and motor generator sets "are moving in the right direction." Some users even require rebates if equipment does not meet energy efficiency specifications.

At Long Lines, management has kept the energy conservation program visible to all employees and to the external community, according to firm's spokesman.

Personnel stay apprised of the computer centers' energy conservation status through announcements on bulletin boards and memos, Shollenberger said.

Energy Reduction

Long Lines reportedly has reduced energy consumption overall by 39% since 1973, and by 6.5% since 1978. Data centers accounted for about 10% of Long Lines power consumption in 1977, Shollenberger estimated.

At the data centers, "we have approached every area where an energy saving can be realized. This includes lighting, temperatures, humidity, insulation, use of timers, outside air for cooling, heat reclamation and the actual powering down of DP equipment not in use.

"Since powering down is of critical concern, our headquarters methods and procedures group has published specific guidelines for powering down of computers and peripheral equipment," the Long Lines supervisor stated.

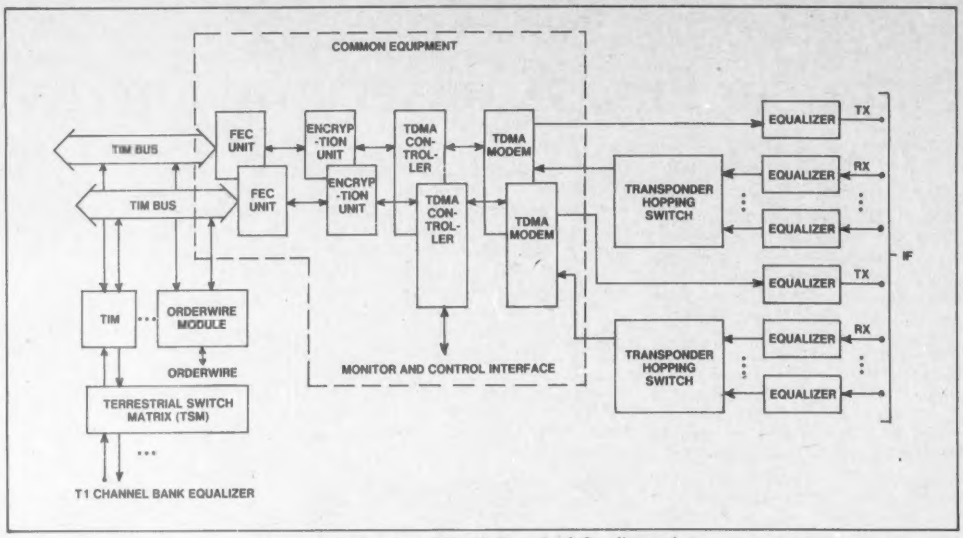


Figure 4: Redundant TDMA Terminal Configuration

TDMA Boosts Efficiency of Satellite Use

(Continued from SR/11)

bursts and frames are structured as shown in Figure 3.

The typical TDMA frame period is 2 msec; it can be as brief as 750 microsec to as long as 20 msec. Within the frame, a burst is designated as the reference burst to enable transmit burst synchronization by using a loopback, feedback or an open loop method.

Receive Burst

The receive burst synchronization is implemented by creation of detection apertures accurately positioned in time with respect to the frame reference time. The carrier burst is variable in duration, depending on the earth station's capacity. To illustrate the TDMA physical configuration, the Aydin Digital Telecommunications TDMA terminal is shown in the photograph. This terminal may incorporate data, voice and video transmissions.

Data rates include the common T1 (1.544M bit/sec) and T2 (6.3M bit/sec) rates. Voice channels run at 64K bit/sec. Video service will include both teleconferencing and broadcast-quality transmissions.

The Aydin TDMA terminal can operate unattended, featuring remote monitor and control with automatic redundancy switch-over. Remote monitoring and control can be performed via satellite using the signaling channel in the burst preamble or via terrestrial lines.

As shown in Figure 4, the terminal has three main sections: terrestrial interface, controller and modem. The terrestrial interface section consists of the terrestrial switch matrix (TSM), the terrestrial interface module (TIM) and the TIM bus.

The controller section is the TDMA system's "heart," consisting of the TDMA controller as well as optional forward error correction and data encryption units. Finally, the modem section has the TDMA modem, equalizers and an optional transponder hopping switch.

TIM functions include compression/expansion buffering, redundant bus interfacing and switch-over, bit stuffing, on-board fault detection with reporting to the control microcomputer, address recognition and both on- and off-line testing.

Housekeeping functions of the TDMA controller include burst synchronization processing, fault detection and isolation, communication with other controllers, operator interfacing and high-speed controller management. The optional data encryption unit in the terminal's controller section conforms to the federal Data Encryption Standard.

Figure 5 shows typical performance of the Aydin modem.

Deal is general manager of digital telecommunications operations for Aydin Corp. in San Jose, Calif.

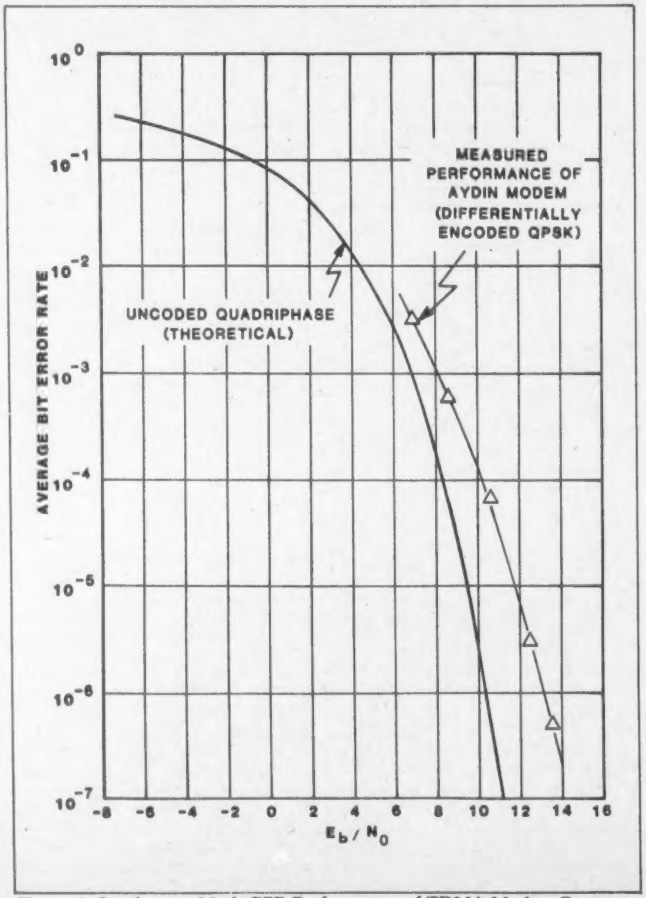


Figure 5: Continuous Mode BER Performance of TDMA Modem Prototype

Reliability No. 1 Priority In User Selection Of Value-Added Network

Special to CW

Network reliability is the No. 1 factor users consider in selecting a value-added network (VAN), according to the nation's third largest telephone company.

Before United Telecom decided to enter the digital communications arena, it conducted a year-long analysis of the VAN marketplace.

The most obvious result of that study was last February's announcement that the firm would offer its once-private Uninet system to the general business community. (For 13 years Uninet has been the nationwide network for United Telecom's Computer Group, serving more than 4,000 internal clients.)

The findings of the study are enlightening, not only as they apply to United Telecom's decision to commercialize Uninet, but also to the VAN market in general and the business community that is making it such a high-growth area.

United Telecom cited growth potential and an insufficient number of current suppliers as dominating characteristics of the VAN marketplace. The current market size of $100 million is expected to jump to $1.4 billion within five years and the needs and demands of the business community will increase dramatically.

This latter increase will not only be in the area of terminal-to-host computer communications, but also in people-to-people (terminal-to-terminal) communications. The current number of commercial VAN suppliers will not be able to satisfy the quickly multiplying needs of the marketplace.

Buying Factors

A major segment of United Telecom's study focused on key buying factors considered by prospective customers when choosing a VAN supplier. Users, vendors and other VAN suppliers were interviewed to determine what those factors are.

Most VAN customers cited network reliability as the No. 1 criterion in selecting a vendor. Whenever a new high-technology product or service is introduced, reliability plays an all-important role, according to Uninet's vice-president of marketing, Chick Keller. Later in its life cycle, reliability becomes an assumed condition and other buying factors take precedence.

"This isn't a surprising finding," said Larry Nebel, vice-president of sales. "If you look back upon the early days of the remote computing industry, you find similar purchasing considerations.

"In the late '60s and early '70s, the main criterion for signing on the dotted line was whether the service worked. In those days, if a system was only down for an hour a day, it was considered a good day.

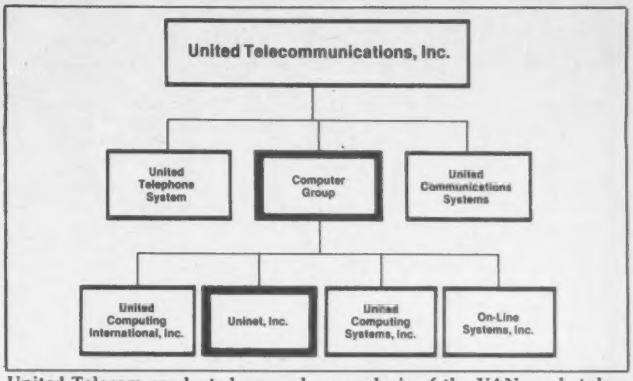
"Now, if a system is down for two hours in a month, customers are justifiably dissatisfied," Nebel noted.

To measure reliability, Uninet has developed two measurement systems.

"We view it as a preventative management system," Keller said, "but the end result is high reliability."

The first index measures network outages. When a component of the network fails, the location and time are recorded.

(Continued on SR/18)



United Telecom conducted a year-long analysis of the VAN marketplace before deciding to commercialize Uninet, its once-private networking facility.

Reliability Tops Users' Criteria for VANs

(Continued from SR/17)

The number of customers affected by the outage is then estimated using statistically derived curves that are updated weekly. This indicates an average number of customers on each component of the network by time of day.

The number of expected users on the network is then multiplied by the minutes of outage to determine the customer minutes of outage (CMO).

The CMO index is a more reliable measure of network availability than average downtime because the CMO index reflects the number of users affected. That is, failures occurring during peak load times are automatically weighted more heavily than failures that occur at other times.

A second index measures how often a user would experience an instance of abnormal customer service — that is, how often something will go wrong because of network problems while a customer is using Uninet. When an outage occurs, the time and location are recorded and the number of customers affected is determined.

These two statistics allow Uninet to manage the network and obtain optimal efficiency by highlighting significant failures: determining proper maintenance; pinpointing failures by hardware, software, facilities or environment; and helping to plan and expand the network by examining usage and failure trends.

Uninet management believes reliability will be a major purchase factor for the next two to three years. As the VAN vendors improve their reliability through sophisticated techniques such as Uninet has pioneered, its importance as a buying factor will steadily decrease until it simply becomes a prerequisite for staying in business.

Geographic Coverage

The second major factor in choosing a network is geographic coverage — providing the service where it is needed.

"Our findings concluded that once a vendor has covered the top 100 cities, it's likely that additional coverage will be dictated by customers," Nebel explained.

"In other words, the first 100 cities are predictable because that's where demand is concentrated. Beyond that point, coverage is based more on chance (where a particular customer happens to have its offices) than on predictable needs of the marketplace."

Network features are the third important buying consideration. All current vendors provide interactive services, and it is expected that vendors will be offering high-speed remote batch capabilities in the near future.

"Our study pointed to an increasing demand for higher speed services," Keller said. "VAN customers need to send larger volumes of data than is practical with current interactive speeds."

By the fourth quarter of this year, Uninet, which currently provides high-speed host-to-host services internally, will be offering commercial high-speed transmissions including 4,800-, 9,600- and 19.2K bit/sec.

Customer Service

Customer service is another key buying factor, the study showed.

"It's only realistic to be prepared for times when the network is not functioning properly," Nebel said. "And it's during those periods that good customer services is measured."

"Nebel's Law" serves as a reminder of that inevitability: "Anyone can design a service that works when it works. It's how it works

(Continued on SR/19)

Independent of Time, Geography

Electronic Mail Cuts Bank's Phone Dependence

NEW YORK — Although most Bell users consider their telephone bill in terms of dollars, Manufacturers Hanover Trust here is more concerned about the time spent on the phone. That is why it decided on an electronic mail system.

"The telephone is not the only tool given to professionals in the past 50 years," noted Richard Groppa, vice-president for technical staff services at Hanover. "Electronic mail is really an alternative for getting communications completed."

His company subscribes to Comet, the electronic mail system offered by Computer Corp. of America. The system began with 10 users in November 1979, but demand has grown steadily. A month after the pilot started, Comet was being used by 30 DP managers, and gradually use was expanded to various operating departments.

Today there are 600 users throughout the company's national, international and metropolitan New York divisions. Corporate users throughout the world are linked with the system via General Telephone and Electronics' (GTE) Telenet packet-switching network and Hanover's own packet network.

The system is based on a Digital Equipment Corp. PDP-11/70 located at Computer Corp. of America's headquarters in Cambridge, Mass.

"Comet has really opened our long-distance communications window," Groppa commented. "I can have an idea here in New York at 7 p.m. Tuesday, put it in the system and know that someone in London will be reading it first thing Wednesday morning his time, if not before. It is independent of time and geography."

The system's simplicity

(Continued on SR/22)

Users Seek Reliability

(Continued from SR/18)

when it doesn't work that counts."

One of the key elements to providing good customer service is dealing quickly and effectively with problems as they arise. Training and providing the means to handle problems is an essential part of customer service.

Finally, financial resources were cited as a major buying factor.

"The capital intensity of VAN services is the reason that many firms are turning to the commercial networks instead of developing in-house counterparts," Nebel pointed out. "Because it requires a high degree of financial resources, customers are understandably concerned with the ability of a public network to provide appropriate resources."

In order to keep up with the growth of the industry, a network must be able to invest a substantial amount of money that may not be realized in immediate profits.

Surprisingly, the cost for the service was not cited as a major buying factor.

"I think our study shows that the buyer has many concerns when it comes to choosing a VAN network," Keller said. "It's still in the early stages of its life cycle, and until it matures, the overriding factors will continue to be reliability, geographic coverage, network features, customer service and financial resources."

This article was contributed by United Telecom Co.

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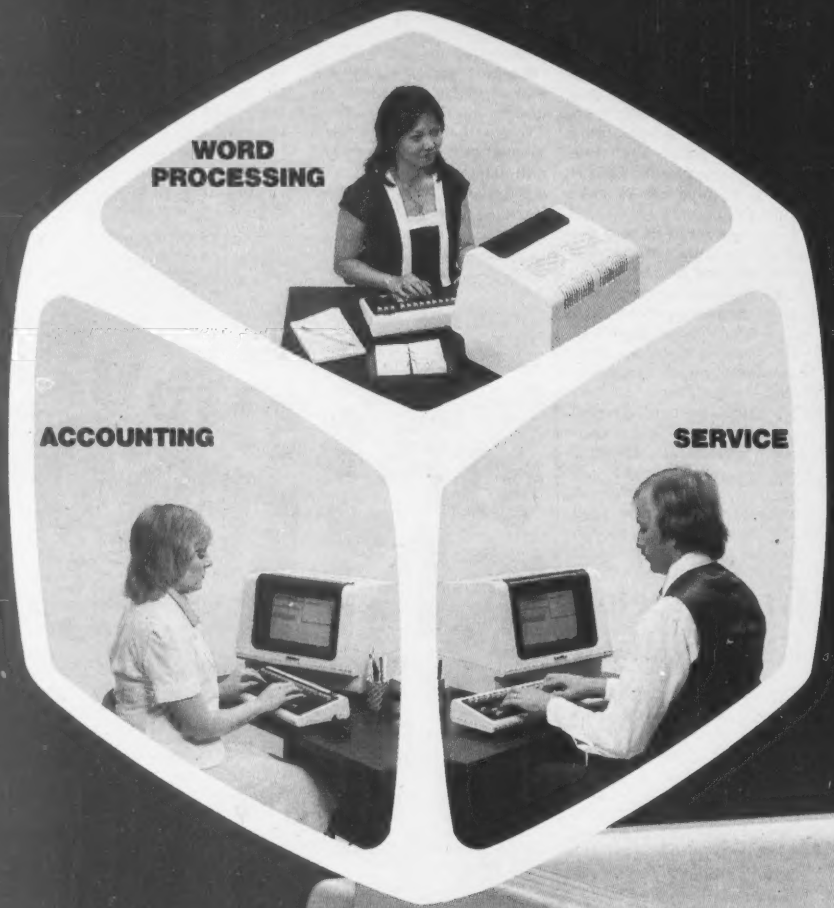

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Technology, Legislative Questions Holding Back

By Alfred Rolington
Special to CW

There are two major problems holding back UK and European satellite communications, both of which will determine how the science will proceed. One is the technological possibilities and the other relates to legislation.

In the U.S., there is now a proliferation of cable-linked services connected by satellite where 30 or 40 video channels are pushed down one cable. The big demand in the U.S. is for high-speed data communications and videoconferencing. Demand is expected to accelerate by about 20% to 30% within the next five years. One American estimate puts the total demand for communications services at $150 billion by 1990.

Satellite Business Systems (SBS) took the lead in orbital communications by successfully launching its hardware last November, and on March 12 it connected its first customer, Boeing Computer Services. SBS now has more than a dozen other clients waiting for data and videoconferencing links.

United Telecommunications and the Continental Telephone Corp., two independent telephone companies, are both in the throes of tying up deals with RCA and Western Union to lease satellite channels in order to expand their communications services.

Developments are increasing so fast that the British

Bank Saved From Phone

(Continued from SR/19)

made it easy for users to accept, he added. "We were told that managers would resent a keyboard, but that just hasn't been the case," he noted.

In assessing the system's contribution to date, Groppa estimated 40% of the Comet messages replace telephone calls, saving an average of about 10 minutes per call. That 10 minutes includes callbacks. According to the vice-president, telephone callers only reach their parties one out of every four attempts.

He now phones his boss about twice a month as opposed to about 10 times a week.

Another 40% of Comet's messages replace memos, buck slips and casual meetings. Groppa is relieved that he no longer is called upon to make snap decisions; instead, he takes things at his own pace via his mailbox.

"My prerogative to do things when I want has been somewhat returned to me," he said.

The remaining 20% of the system's messages are the most important ones, he said. Those are the communications that never took place before because they involved too much trouble in the form of telephone calls, writing, typing or meetings.

Daily Savings

Initial studies indicate there is a large potential for greater productivity if it is assumed that time saved in communications will result in greater work output. Groppa estimated Comet is saving his company's professionals an average of 30 minutes daily.

Even more important, he said, are the "soft" benefits associated with the system, the foremost being the fact that Hanover managers are now better informed and therefore able to make better decisions. People now communicate information more freely.

Also important is the role the system has played in acclimating managers and professionals to hands-on involvement with office technology.

UK, European Satellite Communications Plans

government has commissioned a report on the American position from the UK-based consultants General Technology Systems. General Technology's project leader for this report, an ex-satellite manager from Hawker Sideley, came back from the U.S. bowled over by the rate of expansion here and more pessimistic about the UK position.

Meanwhile, in the U.S., fears have already surfaced concerning the IBM involvement in SBS, which some believe is far too strong, making the system just another IBM-controlled product, something it was deliberately not meant to be.

Immediate Problems

However, the immediate and potential problems in the UK and Europe over who controls what are even more volatile.

Complaints against the European postal, telephone and telegraph authorities (PTTs) are mounting. It was not until the French government began to back a domestic French satellite system that British Telecom was goaded into life. At last it realized that its head had been in the sand long enough and it announced, in full trumpet-blowing splendor, its own satellite link.

British Telecom commissioned Ferranti to build transportable ground stations and offered contracts for testing the system to potential customers. To date it appears Ferranti still has not delivered the ground stations, and the deal for the remaining 25 dishes still has not been put out for tender.

At one point it was mooted that there should be a dedicated UK satellite that would serve the oil rigs and other large business needs, including a direct broadcasting system linkup. This is still not completely redundant, and the new tie between British Petroleum, Barclays and Cable and Wireless may provide something similar. However, there are problems with the economics of the system.

Dead Before It Starts?

The idea that there will be a host of small dishes lodged on every office rooftop within a few years could be dead before it starts. Problems arise not only over British Telecom's monopoly, but also over straight financial and technical difficulties.

Satellites that would be used for this type of system are placed geostationary, 22,500 miles over the equator, where they remain static, holding the same orbital speed as the Earth. One operational reason for this is that it cuts the tracking problem on the ground; early satellites had low orbits and had to be tracked by moving ground stations, adding support and technical difficulties.

Additional problems arise when using geostationary orbits directed at the northern hemisphere. Locations like the UK have a fairly low azimuth, and cities produce a large amount of shadowing because of building density. Therefore, with high frequencies, which need to be accurately directional, difficulties arise with the power of the signal.

A more reasonable solution to these restrictions would be to use larger dishes that would serve whole communities. These communities could be as large as London itself and would then be linked by cable on a distribution system. But, again, current legislation inhibits changes by allowing British Telecom to maintain its monopoly — something the Telecommunications Bill may help to alleviate.

As one of the manufacturers recently explained, "Microwave dishes on the roof or a satellite terminal on an

(Continued on SR/24)

Two Problems Holding Up Satellite Projects

(Continued from SR/23)

office block could bring in massive bandwidths, but you have the additional problem of frequency pollution and the sighting of the dishes and cabling. However, where you have a static population you can have long-term planning, and it is relatively simple to work out your needs."

Of course other headaches arise where one has to deal with rapidly developing conurbations of industry and administration. But as one potential user put it: "Administration can move very quickly, far quicker than the Post Office's planners."

The economic argument for opening up the airwaves to competition is a strong one. As the advocates stress, the radio spectrum above 1,000MHz is virtually unused, free, easily accessible and nondepleting. Few want to argue at present that the spectrum below 1,000MHz should not be used for the fixed services of the PTT, but above 1,000MHz, where the range is more the result of a line of sight, they feel it should be available for competition.

Multipoint Distribution

Advocates of free competition want to see a microwave multipoint distribution system set up in cities on frequencies above 1,000MHz, which would provide broadband widths available to companies collectively using the same system. At present, a company can get a microwave system licensed by the Home Office Radio Regulatory Department. British Leyland has a microwave link for London to Birmingham but, so the arguments go, this is rather wasteful in frequencies, mainly because this causes peak-hour congestion and, for the vast majority of the time, the frequency is quiescent.

Many want to see a common carrier system because it is easy to add a directional receiver and transmitter, which offer the broader bandwidths, thereby making the system potentially more efficient and the satellite connection easier. Preferably it would be plugged into a digital time division, multiple-access system. This would connect the customer from his office building by a microwave link to satellite transmission and then via satellite to other parts of the country or to anywhere in the world.

Last year, the consortium of PTTs that make up the controllers of the European Telecommunications Satellite system (ECS) decided to alter its system so that it could be used with small 4-meter dishes, and in due process, British Telecom announced that it would be offering full communications links via satellite to customers' roofs by 1983.

However, three different studies have shown that this type of system would make the costs far too high for all but the largest companies.

Most data communications managers contacted by *Computerworld UK* said they are interested in satellite communications, but not at current prices. Most feel that unless the economics "come down to earth" they cannot seriously contemplate the idea.

This is not unusual or surprising and only bears out the U.S. experience, for until private consortiums can experiment with different systems, the costs will remain extremely high.

It has taken many years and a great deal of experience and expense to fine tune the data communications networks that now exist. As a result, large organizations cannot make the satellite switch too readily. However, sheer international competition may force this upon them far sooner than they may want.

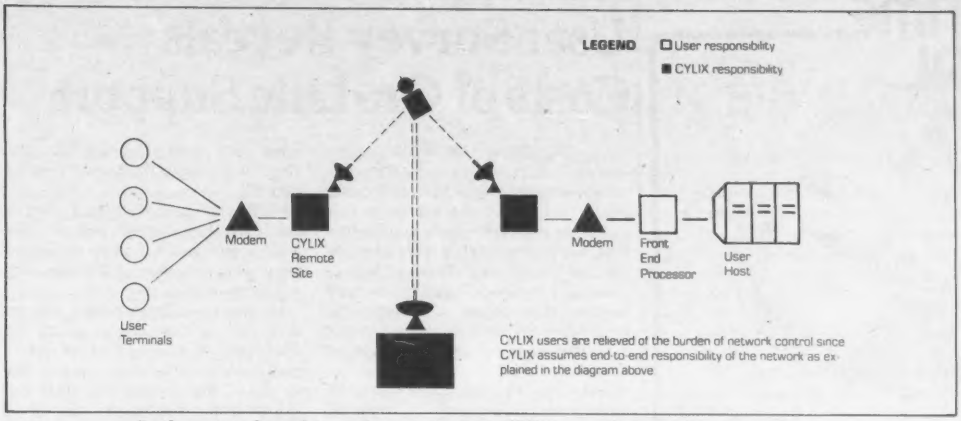
At present the banking fraternity is turning a blind eye to the prospect, for one reason because it would probably mean their joining forces to meet their combined needs.

Nevertheless, the PTTs are continuing to work on ECS, which first began in the early 1970s. The original conception was for four satellites at a cost of some $180 million, which were originally due for launch at the end of this year. Their subsequent change of plan is a direct reflection of their studies on the American SBS system, where rooftop dishes are in operation.

The major advantage of office-top satellite communications belongs to the computer users allowing computers to "talk" to one another at many megabits per second.

Another drawback to the satellite solution is the high cost of ground-based terminals and dishes with costs ranging from a few hundred pounds for a receive-only dish to many thousands for both receive and transmit. However, there seems no doubt in most manufacturers' minds that the costs would come down dramatically if competition were allowed to flourish.

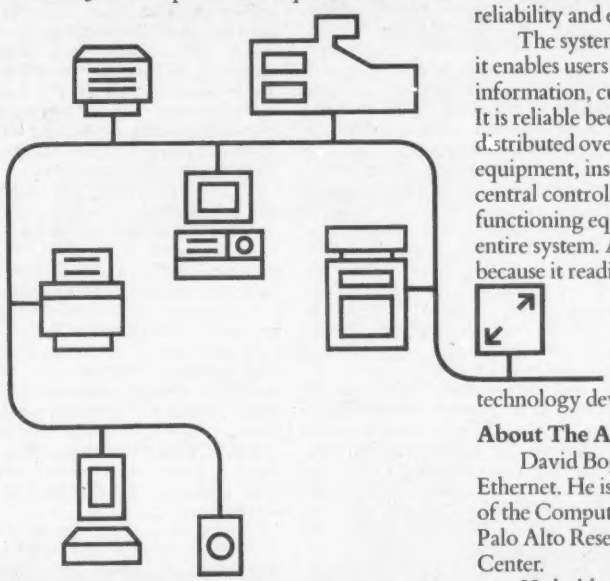
This article previously appeared in Computerworld UK.



In the network, end-to-end support responsibility goes from modem to modem.

random amount of time, on the order of microseconds, and tries again. The more times a station collides, the longer, on the average, it waits before trying again.

In the technical literature, this technique is called carrier-sense multiple-access with collision detection. It is a modification of a method developed by researchers at the University of Hawaii and further refined by my colleague Dr. Robert Metcalfe. As long as the interval during which stations elbow each other for control of the cable is short relative to the interval during which the winner uses the cable, it is very efficient. Just as important, it requires no central



control—there is no distinguished station to break or become overloaded.

The System

With the foregoing problems solved, Ethernet was ready for introduction. It consists of a few relatively simple components:

Ether. This is the cable referred to earlier. Since it consists of just copper and plastic, its reliability is high and its cost is low.

Transceivers. These are small boxes that insert and extract bits of information as they pass by on the cable.

Controllers. These are large scale integrated circuit chips which enable all sorts of equipment, from communicating typewriters to mainframe computers, regardless of the manufacturer, to connect to the Ethernet.

The resulting system is not only fast (transmitting millions of bits of information per second), it's essentially modular in design. It's largely because of this modularity that Ethernet succeeds in meeting its objectives of economy, reliability and expandability.

The system is economical simply because it enables users to share both equipment and information, cutting down on hardware costs. It is reliable because control of the system is distributed over many pieces of communicating equipment, instead of being vested in a single central controller where a single piece of malfunctioning equipment can immobilize an entire system. And Ethernet is expandable because it readily accepts new pieces of information processing equipment. This enables an organization to plug in new machines gradually, as its needs dictate, or as technology develops new and better ones.

About The Author

David Boggs is one of the inventors of Ethernet. He is a member of the research staff of the Computer Science Laboratory at Xerox's Palo Alto Research Center.

He holds a Bachelor's degree in Electrical Engineering from Princeton University and a Master's degree from Stanford University, where he is currently pursuing a Ph.D.

Survey Covers Cost Factors For Support Of Networks Using 3270s

By Carl Sievert
Special to CW

Few managers of on-line data communications networks can say with certainty that their networks provide optimum cost-effectiveness. Not only is it difficult to sort out the available alternatives among equipment and services offered by vendors and carriers, but it is just as hard to calculate (or predict) the full costs required to install and maintain the highly reliable networks needed for typical medium-volume, on-line data processing activities.

The Cylix Communications Network, a subsidiary of Memphis-based Data Communications Corp., recently completed the first phase of a survey and network cost analysis of IBM 3270-type network users.

The results show that only two-thirds of overall "end-to-end" costs are directly attributable to leased lines and modems. The rest relate to keeping the network on-line — they include less obvious types of network support ranging from full- and part-time staffers and their professional needs, to message switching and diagnostic/backup equipment.

Knowing the full extent of support costs and the reasons behind them can help communications managers evaluate not just whether to build a private network or buy from an available service, but also which of the available "enhanced" networks may prove most cost-effective for on-line applications.

People Support

Network support begins with people, for planning, installation, programming and maintenance. In our cost-analysis sample, full-time network staffing accounts for 12.5% of the monthly per-drop network cost. (Relative weightings of cost factors remain consistent if measured on a per-drop basis— each drop is a separate remote location in the network, and user terminals within the location are not considered in factoring network costs.)

Staff support includes salaries and personnel benefits, with benefits averaging 20% to 30% of salaries. In our sample, a 30-drop network — our average user — requires one dedicated staffer at an average annual salary of just more than $20,000.

Depending on network complexities, of course, this can vary for very small or very large networks. Because of the minimum typical requirements of a manager and technician, a 10-drop network might require two staffers, whereas a very large network, benefiting from economies of scale, may need fewer per-drop staff than our average.

Hidden beyond these figures are the personalities of the people them

(Continued on SR/26)

User Survey Reveals Costs of On-Line Support

(Continued from SR/25)

selves. The stronger a network user's troubleshooting expertise and credibility, the better the response that can be expected from the phone-line and modem repair people who are needed frequently. This applies to enhanced-network vendors as well — they must possess the diagnostic credibility to command fast response from the repair teams that support their networks.

Following the dedicated network staff, specific network allocations from corporate funding account for an average 9.3% of costs. They include part-time personnel borrowed from other departments, plus network staff support in general — furniture, floor space and telephones.

In our 30-drop sample average, the corporate-allocations cost for a one-third-time person was $23 per drop per month; network staff space and utilities added another $30 per drop.

Equipment costs cover node-switching installations, network-monitoring and backup equipment. In many cases, extensive redundant hardware and mechanical backup mechanisms are required to assure network availability in the face of the wide range of disasters communications systems are subject to, from malfunctioning lines and modems to earthquakes, fires or floods.

Large Net Users

Nodal message-switching systems are typically utilized by companies with larger networks — usually those with 100 drops or more — to reduce the numbers of phone lines over long-distance connections. Nodal computers maintain assignment tables and keep statistical "watch" over their message traffic. They route messages to proper destinations and collect data for later system accounting and diagnostic functions. Based on our 30-drop sample, the prorated average cost per drop of nodal support is $39 — about 6.9% of overall network cost.

The last cost factor covers equipment for diagnosis and system backup, at 4.3% of overall cost. For a 30-drop user, that comes to $14 per drop for diagnostics, patch panels, tone generators, analyzers and other equipment, plus $10 per drop for backup switches, spare loops and supplemental power supplies.

The 3270 user survey was conducted early this year. It covered an industrial and geographic cross-section of 89 U.S.-based businesses, each with on-line communications volume of between one million and 50 million characters per month.

After the initial survey was completed, a second sampling of 20 users produced the actual cost tabulations analyzed here. Additional samplings of the remaining survey respondents are now under way by Cylix researchers.

Users Not Satisfied

The user survey showed that nearly a quarter of respondents were not satisfied with their current network costs (60% were "somewhat satisfied," while only 18% were "very satisfied").

More important, 72% said they do not know their overall network operating costs and, of those who did, most were unaware of the less obvious support costs.

Average overall per-month cost per drop among our sample group was $567. Of that, 67% — $380 — was directly attributable to leased-line and modem costs. Leased-line costs had the widest per-drop variance of all factors, between $150 and $572 per month; users with widely dispersed remote locations typically pay higher line charges than users with closely grouped drops.

As a result, phone-line charges tend to penalize industries with wide geographic operations such as insurance and transportation.

Modem Costs

Modem costs ranged from $60 to $200 per drop, with an average of $140. This range covers both point-to-point and multipoint network types — most of our survey participants use combinations of the two. Point-to-point connections require two modems, one at each end, while multipoint links use one master modem to communicate with groups of remote modems.

Managers of communications networks can calculate and compare costs by breaking down per-drop, per-month figures in the five categories used here: network staffing, corporate allocations, switching nodes (if applicable), support equipment and leased line/modem costs.

For network staffing, for example, the full salaries and benefits of full-time staffers should be divided by 12 for a per-month average, then divided again by the number of drops — remote locations — in the network.

After these costs are collected and organized, managers can better decide whether to build or buy end-to-end network services. To build means to assemble modems, phone lines, staffers and supporting equipment into the most reliable and cost-effective network possible, then to work with vendors — phone-companies especially — to maintain that effectiveness.

To buy is to join one or more of the growing number of enhanced networks. These range from lower speed, dial-up facilities like those offered by Telenet Communications Corp. and Tymnet, Inc., to higher speed, dedicated packet-switching services like our Cylix network and onto very high-performance, satellite-based voice/data systems. The more "turnkey" a network, the more it will absorb the user's network costs in return for set data transmission charges.

Sievert is market research manager at Cylix Communications Network, a subsidiary of Memphis-based Data Communications Corp. A copy of the Cylix cost analysis report is available from Seivert at Suite 101, 855 Ridge Lake Blvd., Memphis 38119.

In Planning Initial Installation

User Considers Network's Versatility First

By Thomas H. Beddow
Special to CW

Any type of proposed network is always subject to change.

The ability to demonstrate a data network's versatility and upgradability is just as important as its reliability, ease of use and, of course, its ability to meet management's current objectives.

At the Farm Credit Banks of Springfield, Mass., these were precisely the concerns the data processing department had just one year ago. Today, the department is in the process of implementing its first comprehensive distributed data network — a system that will tie together and at the same time provide limited independent processing power to all 66 offices of the northeast region's Farm Credit System.

Careful Planning

Getting from there to here, however, took careful planning — especially since all equipment was to be purchased and the cost shared by every office in the Farm Credit Banks' eight-state district. With two separate banks — the Federal Land Bank and the Production Credit Association — housed in each remote office to handle both short- and long-term loans, it was decided that only a "true" distributed data processing network would be able to meet their needs.

Ultimately, computers would be installed in all 66 offices — each supporting one or more CRT terminals and printers and their own mini data bases. Additionally, communications channels to Springfield headquarters would have to be available for remote processing and transaction-type applications.

Resolving the details, selecting equipment and establishing a phased installation plan was the second order of business. Uppermost on the agenda: the design of a flexible information system that could satisfy both immediate and long-term goals. The Farm Credit Banks found the solution in Digital Equipment Corp.'s PDP-11/23 minicomputers, Decnet communications software and Codex Corp.'s data communications equipment.

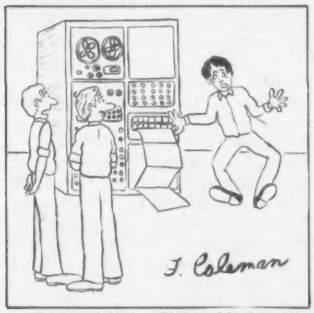
By combining these elements, they found they could continue to access their two existing in-house PDP-11/70s, obtain overall network compatibility and have the ability to operate in the most cost-efficient manner at any given time.

Indeed, it's the kind of flexibility made possible only by good planning. For example, software programs are now supplied by the DP department to a total of 10 field offices where the new equipment is installed, with the programs essentially used for data entry with minimal remote processing.

Automatic Dial Up

At night, one PDP-11/70 at the central facility automatically dials up each site in turn, processes the data and routes final loan and credit reports back to the remote offices. Later, if the traffic load warrants using dedicated lines, leased lines can be added without having to change modems or software.

(Continued on SR/28)



'I Think Ridley's Right. Maybe We Shouldn't Go For Bigger Bytes.'

User Views Versatility as First Consideration

(Continued from SR/27)

With Phase III Decnet, Farm Credit Banks has the ability to link different offices together whenever necessary, operate direct-dial over the switched network or operate point-to-point or multipoint over leased lines. The Codex large-scale integration (LSI) 48/V.27 modem also has this ability to go from one mode of operation to another, migrating from dial operation at 2,400 bit/sec to 4,800 bit/sec, from dial to dedicated point-to-point, and then from point-to-point to full multipoint operation.

Cost — and maintaining optimum system availability for all network users — will be a key factor in determining when these "migrations" occur. Right now, using dial communications is definitely the most cost-effective solution, according to Thomas Beddow, director of data processing.

Using inbound and outbound Wats lines as opposed to leased circuits, he estimated a savings of approximately $9,000/mo was made. "Of course, leased lines are available around the clock.

"But at this point, we foresee transmitting data for only about a half-hour per site each day. Once this increases to one-and-one-half hours, we can justify the changeover; meanwhile, we have the equipment in place to handle it either way," Beddow said.

No Manual Dialing

Because a Codex auto-call unit is also used, the current dial configuration actually entails no manual dialing. The PDP-11/70 computer sends a signal to the auto-call unit, which then places a call that the remote modem automatically answers. When its transmission is complete, disconnection occurs automatically.

This process is continued until all sites have been dialed, much like a poll sequence on a leased line. Rather than being charged a flat monthly rate for a leased line, however, Farm Credit Banks only incurs additional Wats metering — a real cost saving.

When the traffic increases and if dedicated lines prove necessary, costs can still be trimmed by operating dial tail circuits whereby a number of LSI 48/V.27 modems dial into a common multiplexer. This method could be used, for example, wherever multiple sites are geographically clustered. By dialing into a local multiplexer, the information gathered would be forwarded over a single dedicated high-speed line, instead of many different lines operating at a lower transmission rate.

Network Flexibility

The Decnet communications software also plays a vital role in ensuring network flexibility. This is chiefly because of its ability to handle the exchange of data between programs — even programs on other systems —to connect nodes dynamically within the network and to perform error-checking and automatic network monitoring functions.

As Beddow explained, "In any given office, there are tax specialists, credit analysts, managers — who will all access information via a limited number of terminals. If they have their own on-line data bases, they can examine them; if not, they can obtain the information they need without ever having to concern themselves about where to get it, or how to get it.

"And neither do we. This 'transparency' simplifies the job of the DP staff tremendously because the same software lets any computer talk to any other computer in the network; it doesn't matter whether they're connected over a telephone line or a piece of coaxial cable in a computer room."

Because all the hardware was purchased rather than leased, other factors also had to be considered during the planning stage. "What we needed were items that are state-of-the-art today," Beddow said. "Because they have to serve us for at least five years, they also had to be reliable and capable of growing along with us. For example, we've been happy with the PDP-11/70.

(Continued on SR/30)

'That Masked Man Who Saved Our Computer . . . Was He an Independent Consultant?'

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Versatility, Upgradability Seen Key to Net Choice

(Continued from SR/28)

"The PDP 11/23s, now being installed at the rate of three per month, each support up to three CRT terminals plus a small printer and offer us 10.4 million characters of removable disk storage. We can double the memory, double the disk and even quadruple them if we have to."

Hidden Diagnostic

To ensure that everything is working properly, the turnkey software developed by the DP department also contains a hidden diagnostic. This essentially checks the communications interface and guarantees that all "glitches" are found before users start accessing the network.

According to Bob McCormick, the man responsible for coordinating and supervising the installation of the Farm Credit Bank's network, "Our users aren't technical people and we don't expect them to be. All they really need to know is that they now have a sophisticated computer that will cut their turnaround time by at least half. They don't have to mail us forms; they can get information the very next day. What's most important to them is that the system works.

"Also important is the availability of good clear documentation. Before we settled on the PDP-11/23s, we established a pilot system in Hudson, N.Y., using a DEC PDT system — a small single-user floppy disk-based system," McCormick explained. "We received so few calls from the users we had to call *them* to ask if everything was all right."

The PDT was also used to isolate user requirements, a critical step since at this stage both hardware and software programs are supplied and maintained by the Springfield staff exclusively. "During this evaluation process we discovered a number of things," McCormick said.

"The PDT was too small for us, but it was user-oriented and served as a trial for the programs we wrote in-house. As to be expected, we started receiving requests for entirely new capabilities, as well as modifications to the existing programs, soon after the users became familiar and comfortable with the system. All these changes have been incorporated into new software for the PDP-11/23s."

Three Applications

Three major applications will be supported in the field: a farm records system, a short-term loan accounting system and a long-term loan system associated with the Federal Land Bank. And according to Tom Beddow, new applications are certain to be requested. When that happens, each request will be reviewed by the Farm Credit Banks' 20 general managers, and, based on their interest, the cost of software development will be shared.

"What we're supplying is a powerful tool," continued Beddow. "It's one that will help our people make better decisions, give them time to carefully analyze situations and let them perform their work more effectively."

With each application incorporated, more possibilities for the system were raised. Because the network has been specially designed to accommodate this growth, Beddow foresees a relatively smooth transition to electronic mail and other such applications.

"We have an exceptional base that I'm sure will be put to use for a long time to come."

Beddow is DP director at Farm Credit Banks in Springfield, Mass.

To Serve Alaska's Remote Areas

Airline Upgrades With Intelligent Terminals

ANCHORAGE, Alaska — The installation of a series of intelligent stand-alone computer terminals has helped Alaska's major intrastate airline to successfully complete a three-phase program to upgrade airline service throughout the state and extend processing and communications services to some of Alaska's farthest-reaching settlements.

"Poor roads, gravel runways and limited telphone service are just a few of the unique problems encountered when serving the air transportation needs of Alaska," James Cook, director of communications for Wien Air Alaska, said.

"Many of our flight points have no other dependable means of access, such as good roads, so we include medical, food and emergency flights among our passenger and business services," he noted. "Coordinating passengers, baggage and flights is somewhat complicated by the relatively primitive nature of communications services to the outlying areas served by Wien."

Nationwide Service

Wien Air Alaska currently serves 20 communities throughout Alaska, Seattle and Portland in the Pacific Northwest with a fleet of 10 737-200C jet aircraft.

The company now uses Computer Service worldwide Pars/Ipars airline reservation network via high-speed communications between the Los Angeles reservation computers and Wien's Anchorage headquarters.

Only a few years ago, Wien's outermost service points had no regular telephone service, so Teletype Corp. terminals and low-speed communications circuits were the only means of communications to Anchorage. Other major airports and service points, including Anchorage, were using Raytheon Data Systems Co. and other intelligent terminals for reservations and ticket-counter processing.

Three-Phase Program

In 1977, Wien launched a three-phase program to improve air service by adding computer processing facilities and upgrading communications to remote locations.

The first phase, completed that same year, consisted of adding Raytheon PTS-100 stand-alone intelligent terminals in Anchorage, Fairbanks and Prudhoe Bay, and moving the other terminal vendors' systems out to replace the Teletype systems in the field.

During phase two (1978), all remote Teletype systems were replaced by higher-speed communications options. The timing of this phase was dictated by the scheduled improvements in Alaska's telephone system, a system that, for geographical reasons, must combine microwave, satellite and tropo-scater transmission techniques.

PTS-100 Terminals

"The third phase, recently completed, entailed the installation of PTS-100 terminal systems to handle the information processing needs of our other large airports — at Point Barrow, Bethel, Nome and Kodiak," Cook said. PTS-100s have also been placed in Kotzebue, Juneau, Ketchikan and, most recently, Seattle.

The older first-generation terminals, previously moved into the smaller towns and villages, will eventually be replaced on an attrition basis with new PTS-100s. In addition, Wien has installed a CRT terminal at the ticket counter in Portland, using Raytheon terminal equipment.

"Before we began the program, data communications traffic was often slower than the airline flights themselves," Cook said. "It might take two to four hours to get a message through via the Teletype system — sometimes the flight would arrive before the message. Our business was growing, but the slow terminals just couldn't keep up with the communications needs.

"Also, we needed greater power and flexibility in our ticket-counter processing at our busier airports," he added. The PTS-100 system suited this need because it performs stand-alone ticketing, cargo and loading-information processing functions for multiple operators located at different terminals, Cook said.

Network Link

In addition, it permits high-speed communications within Wien's network from Anchorage, with the Los Angeles Pars/Ipars reservations mainframe.

Essentially, the company moved the older terminals farther out into the field and replaced them with the PTS-100 terminals at its busiest airports.

As a result, cargo and operations personnel at these airports no longer have to share the ticket-counter terminals to do their processing, as they did with the other system.

The PTS-100 terminals also allow automatic ticket-printing. Since 1976, the airline has been able to increase the number of hard-copy and ticket printers from five to more than 60 in the main line airports, according to Cook.

In all, airline data must travel many miles to coordinate reservations, ticketing, loading and freight functions. All reservation information, whether generated from the Los Angeles Pars/Ipars computer or from Alaska, is first filed in Los Angeles, then pulled to Wien's Anchorage headquarters when it is needed via transmission over a 2,500-mile data circuit.

From Anchorage, flight and reservations data are multiplexed and sent to their appropriate airport destinations throughout the state.

If a reservation is placed in Fairbanks Airport, for example, that data must travel to Los Angeles for filing, then go back to Anchorage for distribution and actual flight processing. This ensures that accurate reservation copies exist on the Los Angeles reservations data base at all times, according to Wein.

Wien is currently moving data between Anchorage and Los Angeles at 7,200 bit/sec because it does not need faster transmission now. However, as it adds new terminals and programs in the future, it may go to a 9,600 bit/sec rate.

"Aside from the terminal-cluster and ticket-printing benefits of the Raytheon Data Systems terminals, we chose them for this program partly because of what they offer for future development," Cook said.

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FCC a 'Reluctant Partner'

Telephone Industry Striving to Modernize

By Walter G. Bolter
Special to CW

In recent years, the telephone industry has been feverishly engaged in a construction and financing program to "transfuse" its vast embedded plant and equipment with more modern, competitive technology.

Concurrent with these efforts, the industry has made a headlong assault on the Federal Communications Commission (FCC) and Congress to relax governmental regulations and requirements.

The objective of these efforts is to permit Bell and its independent telephone company partners to put in place superior facilities for competition with terrestrial and satellite carriers and equipment suppliers, now struggling for position in formerly monopolized markets.

This process must be completed by the mid-1980s before telephone company market shares and captive demand are so eroded that recovery of outdated plants and equipment is foreclosed.

The industry's wager in this game is its vast telephone plant in service and the financial and economic health of these assets. The FCC is a "reluctant partner" in the whole process.

In the past, the Bell System and independent telephone companies have followed FCC rules concerning the keeping of accounts, records and other materials the commission may wish to review. The FCC prescribes depreciation rates for about 35 of the largest Bell and non-Bell operating companies.

Annual Review

These companies are reviewed in annual meetings between FCC staff, representatives of the company involved and state regulatory commission personnel. Each operating company's rates are reviewed at least every third year in a highly technical process that involves negotiation.

Until recently, this system for determining proper book value of telephone company assets worked to the general satisfaction of all concerned. Annual revenue requirements and rates that regulatory commissions might permit telephone companies to impose on subscribers were generally lower than they otherwise would be.

This was an attractive situation politically, especially at the state level, and continued growth of telephone company earnings made telephone companies more attractive to shareholders and new investors.

On balance, this system of capital recovery may simply have put off the telephone companies' day of reckoning. On that "day," an abrupt change in technology, inflation, market entry or demand conditions could cause utilities to evaluate their past investment decisions much as private industry is required to do.

At such a point, carrier management and regulators would have to make severe price adjustments.

Plant Investment

Total plant investment of the Bell System and independent telephone companies was about $155.5 billion in 1979, while industry expenditures for new construction totaled roughly $20 billion. Bell's plant investment was then $123.9 billion — approximately 80% of the industry total. AT&T operating revenues were $45.4 billion, about 83% of the entire industry.

In terms of operating revenues, Bell ranks among the three largest U.S. industrial corporations. Exxon Corp. and General Motors Corp. have larger sales, yet AT&T's total assets exceed the combined assets of Exxon and General Motors by about 40%.

Indeed, Bell's 1979 construction expenditures totaled more than the combined assets of roughly 60% of the 15 largest U.S. industrial corporations.

This relentless march forward in capital growth is likely to continue indefinite-

(Continued on SR/36)

These articles by Walter G. Bolter were adapted by permission from his contribution to International Data Corp.'s February "Telecom Insider" newsletter.

Reserve Ratios Present Headache For Phone Companies

By Walter G. Bolter
Special to CW

IBM, Xerox Corp. and other DP vendors moving into telecommunications markets do not suffer nearly so much from a certain problem as do telephone companies, some of which eye DP markets from a foundation in telecommunications.

The problem concerns "reserve ratios" — the proportion of plant in service recovered through past depreciation.

IBM and Xerox have recovered well more than half their fixed assets through past depreciation charges. For IBM the figures are 54% and for Xerox, 57%. This is in contrast to the Bell System recovery of just 19.4%, while independent telephone companies collectively have a 3.6% recovery rate.

While the implied life (period of recovery) for Bell's fixed assets is about 20 years, asset lives for IBM and Xerox figure to be roughly 9.5 years.

Thus, the conversion process for Bell System facilities lags behind new entrants in telecommunications by a factor of about two. Clearly, recent technological innovation must be an obvious concern to telephone companies.

Moreover, embedded capital revenue requirements, which must still be recovered, may add a premium to the price of AT&T services which compete with those of measurements.

Measurement of just how big a hole AT&T and the other telephone companies are in, respecting unrecovered capital from past periods, depends on assumptions concerning proper equipment lives, methodologies and other variables.

By various measures, the telephone company plant is underdepreciated.

Comparative Levels

If telephone company reserve were at the 1950 level, they would be $10 billion higher than now. If they were at the same level as IBM and Xerox, the reserves would be $49 billion higher.

There may be phantom costs involved, such as labor entailed by installation of station equipment subsequently capitalized. The gap in telephone company reserves is smaller by the amount of phantom costs.

Estimates Bell made in 1979 for the Securities and Exchange Commission on replacement costs for existing plant suggests that current costs of depreciable plant would be up $18 billion.

There are several avenues Bell and the larger independent telephone companies may take in order to turn over outdated or overvalued asset amounts and revitalize facilities with new technology.

All of these avenues would need cooperation from the Federal Communications Commission (FCC).

(Continued on SR/36)

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Telephone Industry, FCC 'Reluctant Partners'

(Continued from SR/33)

ly. The telephone industry is rapidly converting its electromechanical switching technology into new electronic and digital equipment, and has indicated plans for "transfusion" of transmission equipment as well.

Fiber-optic systems, single sideband and other improvements are being rapidly deployed.

Moreover, internal packet data networks are being implemented to enhance public telephone capabilities, providing new service alternatives and improved network efficiency.

Given the industry's emphasis on investment, it is not surprising that capital-related costs have absorbed significant portions of telephone company operating revenues.

For example, in 1979, such costs represented about 42% of AT&T's revenues, totaling about $18.5 billion. Depreciation expenses were approximately one-third of this amount.

High Stakes

These figures indicate the high stakes involved in recovery of telephone company investment and the level of capital-related expenses.

However, telephone companies are not concerned with present depreciation and related expenses or the level of rates needed to recover these costs. Instead, telephone companies support capital costs and rate levels that are still higher.

It seems evident that risks associated with continuation of past industry/regulatory investment practices, in the face of current market and technological conditions, are too great for even a firm the size and power of the Bell System to bear. Moreover, there is considerable concern both within and outside the industry about the financial health of embedded industry assets.

A certified public accountant with a Ph.D. in economics, Bolter is a consultant and contributing editor to International Data Corp.'s newsletter, the Telecom Insider. *He was formerly chief economist for the Federal Communications Commission's Common Carrier Bureau.*

Phone Company Hurting

(Continued from SR/33)

The most obvious alternative is an advocacy of shorter lives for the various classes of telephone company assets, on an account-by-account basis, during the annual three-way meetings between the FCC, each phone company and state regulatory agencies.

Bell Decision?

Apparently, Bell has decided it cannot offset attempts by its bulk customers to become more independent of Bell's public network. In the short run, these customers have been included among those that will "finance" Bell's capital recovery and plant revitalization effort.

Large users, of course, will increasingly become the prey of MCI Communications Corp., Southern Pacific Communications Co. and other smaller AT&T competitors.

However, over the long term, Bell will have the capacity, service options, quality and service assurances that these others lack and will be able to provide telecommunication services over the most up-to-date, flexible facilities.

At that juncture, Bell may be able to short-circuit its pesky terrestrial competitors and still be in a position to compete with more substantive competition, such as that provided by the satellite carriers and new, larger entrants (Exxon Corp., for example).

Over the long run, or after transfusion of its plant is complete, Bell's competitive and financial prospects are exceedingly bright. It will retain bottleneck capabilities in local-exchange areas.

AT&T also will have the latest plant in place and the facility size to benefit from economies probably superior to what competitors will have.

Bell's plant will be exceedingly flexible and capable of producing new, unmatchable services which undoubtedly will become an increasingly important part of Bell's earnings.

AT&T's largest expense, namely depreciation, will reflect current costs of service rather than past regulatory schemes that may have built up unproductive book costs during the monopoly period.

Best of all, in an era of packet switching, fiber-optic transmission, cellular radio and other plant innovations, regulatory constraints on Bell's pricing and other competitive responses are likely to be largely removed.

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• *With Normal Phone Operations*

Seattle Utilities Firm Solves Data Problems,

By Chuck Muller
Special to CW

SEATTLE — Why should a company have to rewire its offices for data when telephone lines are already in place?

That's the problem Teltone of Kirkland, Wash., solved for ENI Companies with the DCS-2B data carrier system. Existing telephone wires are used — simultaneously — for normal telephone operations and full-duplex asynchronous data up to 9,600 bit/sec.

Each user gets a small plug-in station unit; a centralized card file fitted with channel termination cards separates the voice and data. The voice is routed to the PBX and the data into a host computer.

Susan Herring of ENI's Investor Communications Department uses a Digital Equipment Corp. VT100 terminal for word processing. The termiinal is connected to a PDP-11/70 over the office phone and PABX circuit through a Teltone M821 station unit which rests under her telephone.

Whenever a person changes work sites, it takes only a few minutes to reallocate service.

ENI is the 17th-largest independent oil and gas company in the U.S. Headquartered near Seattle in Bellevue, Wash., it is a nondrilling, nonproducing energy company that raises funds and sets up limited partnerships for domestic oil and natural gas exploration.

"The size of our data base is equivalent to keeping the books on 80 companies," declared Bill Stites, ENI's acting director of information services. "We have over 6,000 investors, 1,500 wells, and 17,000 leases in our 80 limited partnerships. We're continuously updating our land fund, lease records and the 'packaging' of our drilling programs. And, of course, we have our own financial data base, too."

According to Bob McMurry, ENI's facilities manager, "We are a service organization; time can be critical when we are preparing information on our clients' investments."

ENI uses a Digital Equipment Corp. PDP-11/70 with 55 terminals: 23 hardwired and 32 connected via Teltone's DCS-2B.

An additional computer, a Hewlett-Packard Co. 3000 Series III, is being brought on-line to specialize in financial information, so the DEC can concentrate on management information.

"ENI has a unique site problem that led us to Teltone," facilities scheduler Weldon Lee said. "We currently occupy three buildings: two are in the same office park and the third — though it's right next door — is in another development under separate ownership.

"We needed to tie all three buildings together for data as our phone lines are tied together for voice. With the Teltone system and a modem for the extra building we made that connection."

Other Advantages

To Lee, the DCS-2B system had these other advantages: "We have it right now — off the shelf. We can use it on our Bell Centrex PBX system. It's completely transparent: if the phone system goes down we still have data, and vice versa.

"Also, though we use mainly 1,200 bit/sec terminals, we have had some 9,600 bit/sec throughput too — we're not limited by 300 bit/sec telephone couplers."

"It's so beautiful!" Stites said with a smile. "We have estimated that it

And Data Flow at 9,600 Bit/Sec •

Using Phone Lines for Three-Building Net

would take one to four hours for somebody to pull cable through the conduits to go just one floor down from the computer room. The Teltone system is just like a hard-wired system without the hard wires. And in an ever-expanding company such as ours, you may not have the opportunity to rewire the place."

That will be particularly important later this year when ENI moves across town to its own building. A local telephone consultant estimated that to wire ENI's new 238,000-sq ft building with data cables parallel to phone lines would cost up to $200,000 extra.

Stites said, "With Teltone, wherever you have a telephone, you can have a terminal. We've already invested about $20,000 in hardware for our 32 workstations on the PDP-11/70, and we'll be adding enough to bring on 16 more for the HP 3000. By our calculations, there's a four-to-one saving."

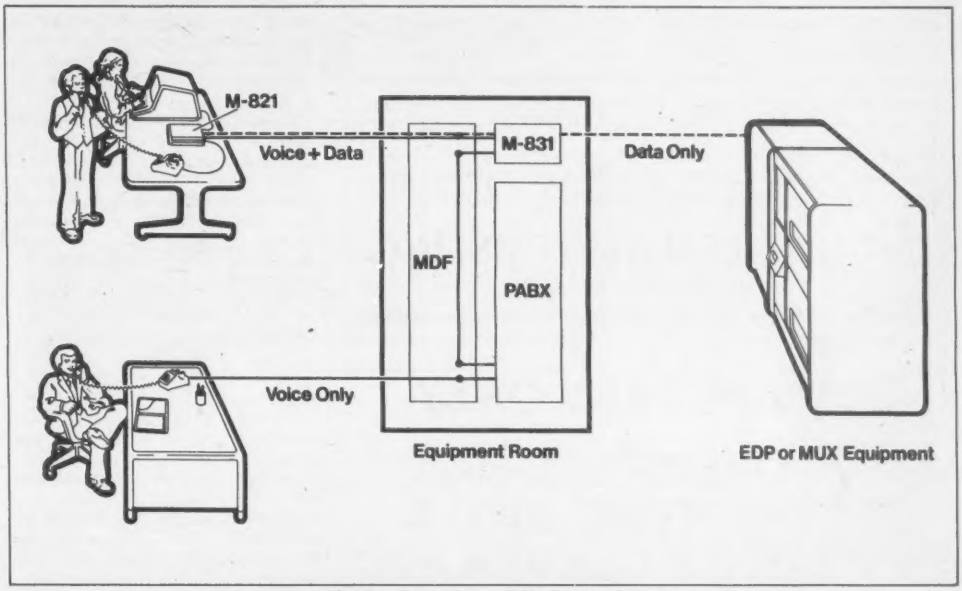
Advantage of Any Office

For Bob McMurry the advantage in any office — old or new — is compatibility with "open office" interiors. "Power, phone and now data can come down the same thin column from the plenum above the ceiling. After all, when you buy an open-office plan you're buying it for flexibility," he insisted.

According to John Joulkes, vice-president for corporate development, data is transmitted with frequency-shift keying, using 36KHz and 40KHz to transmit data from the station unit to the termination circuit, and 72KHz and 80KHz in the reverse direction.

Low-pass, passive L-C filters are

(Continued on SR/40)



The Configuration at ENI Companies

Utility Firm Ties Buildings By Means of Existing Lines

(Continued from SR/39)

used to isolate the telephone and PABX from the high frequencies used in data traffic, allowing the telephone link to function normally. Full-duplex asynchronous data, at any speed up to 9,600 bit/sec, can be carried as far as 5,000 ft on a 26-gauge wire pair with a maximum 17dB loss at 80KHz.

We use DCS-2B in our own plant to get data from the terminal to the main distribution frame of the PABX. To get the data to the computer room, if the plant is small, one multipair cable can haul the data and voice to the computer room, where it dumps the data and returns to the PABX with the voice.

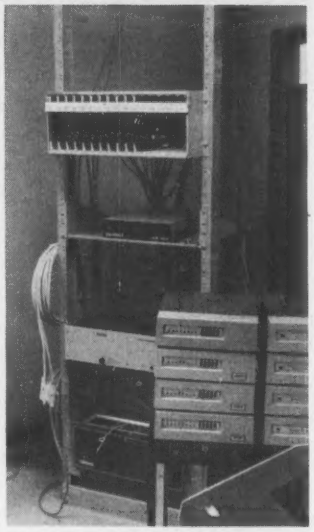
Easy Coordination

Coordinating with the local phone company is easy. The DCS is registered with the Federal Communications Commission. It has been approved by AT&T headquarters for "interpositioning." The data user can own the DCS and use it on a Bell operating company-owned phone system.

The phone company visits the premises only to install RJ 71C jacks for the channel termination card. The jacks are standard, tariffed items.

In a larger plant or campus situation, a "dumb" multiplexer is used to put 32 channels onto two pairs in a T1 format.

T1 is more commonly used to carry 24 channels of 8-bit PCM, 1.544M bit/sec but, though the technical efficiency appears to be low, at 23%, the economics for distances of a few miles is overwhelming because T1 span lines are inherently cheap. The wiring is already in place, and it pays to cram as many terminals in as possible.



ENI put its Teltone DCS-2B equipment in a corner of its computer room. From top to bottom, the rack holds 11 data cards in the M831 card file; a modem from the adjacent building served by a separate telephone circuit; power supply; and DCA multiplexer. At the right are outside phone line modems.

Muller is marketing communications coordinator at Teltone Corp. in Kirkland, Wash.

Not Uncontrollable Expense

Private-Line Costs Cut by Attention to Detail

By K. A. Reagh
Special to CW

Rate increases, such as those recently filed by AT&T for its private-line service, need not be written off by top executives as one of those uncontrollable expenses — especially if those private lines are used for data communications.

Executives should pay closer attention to data communications private-line expenses because they have usually outpaced expenditures for other electronic communications. Fast growth and rapid change means lines were installed to remote facilities with little or no attention paid to their point-to-point relationships.

Even those networks that use line-sharing devices such as multiplexers and concentrators may not be getting the most advantageous line rates due to the placement of the devices.

Information gathered by Datacraft Information Services shows small and medium-sized networks, with up to 500 remote terminations, are particularly vulnerable to leasing a more costly configuration. Usually, the manager of a small network is simply not aware that differing network configurations will result in differing lease prices. The organization with the medium-size network may have more line waste per facility than the small operation.

These organizations usually employ personnel who design and implement their system to configure and install the leased network. However, since the staff is untrained in tariffs and regulatory procedures, they know little or nothing of implementing a network of lines designed for the lowest monthly price.

Costly Results

The result is costly. A network of 100 terminations of 10 each on 10 lines having just two terminations on each line improperly placed could be spending between $2,500 and $5,000 more per year than necessary.

Executives who want to know if their data communications network is in need of reconfiguration must get inquisitive. Start by asking the data processing staff for a document showing the layout of the network. If they are unable to produce a map, diagram or listing of the network including line numbers, terminations and total lease costs, then it is time for the executive to get involved.

The bill comes in, the money goes out. There is no attempt to find out if the right terminations are accessed to each line and if proper credits for service outages are posted.

Another symptom of organizations using improperly configured networks is manifested by a staff failure to retain current copies of all common carrier tariffs with which they do business.

Tariffs are authored by the company as a statement of how they intend to provide a service. If the tariffs are accepted, and they usually are unless there is public input to the contrary, tariffs become a contract between the carrier and the customer.

The carrier always holds the customer to the letter of the contract. The customer who does not keep copies of the tariff lacks the ability to hold the carrier to the contract.

Organizations keeping tariffs become involved as a consumer in the regulatory process, are able to ensure the carrier provides the services called for in the tariff, and as a result, pay less for the same service than the customer who does not retain copies of applicable tariffs.

The days of the inexpensive private lines are over. Several years ago, in relation to the organization's data communications hardware and software costs, private line charges were not of great concern.

Since these communications systems were generally inflexible, the typical method of solving the problems of a large user was to install a dedicated line or to place the user on a line with low volume terminations.

Today, however, the lease costs of private lines rise continually while the cost of the communications equipment, hardware and software remains relatively stable. Additionally, these systems have become increasingly flexible.

As a result, it is less expensive to solve problems created by large-volume users by equipmental methods rather than the installation of additional telephone lines. Therefore, it is always less expensive in the long run to lease the least amount of telephone lines that will get the job done and provide for adequate growth.

Reagh is a senior partner at Datacraft Information Services, Des Moines, Iowa, a consulting company that specializes in designing networks.

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Better Throughput Cited

Consultant Praises SNA Version Three

By Bruce Hoard
CW Staff

LANCASTER, Pa. — Version Three of IBM's Systems Network Architecture (SNA) offers better throughput, survivability, traffic management, user priorities and improved recovery and control than did the two earlier versions, consultant Douglas Smith told the recent annual meeting of the Association of Data Communications Users here.

Smith gave a rundown of SNA's evolutionary path, noting the first version was limited to point-to-point communications between terminals and front-end processors. Although it offered a full-duplex protocol in Synchronous Data Link Control, the capability was diminished by the fact that many terminals attached to the full-duplex line were themselves limited to half-duplex operation.

The Advanced Communication Facility offered by Release Two of SNA liberated users from their point-to-point bondage, but in a qualified way, he commented. Despite the fact that various computers could communicate with each other, they were still required to ask "permission" from software embedded in the system in order to do so.

And the improvement was not without its price, Smith added. While a computer was initiating a conversation with another, it was not available for backup purposes.

Release Three

Release Three, introduced two years ago, moved to alleviate the deficiencies of its predecessors by introducing more alternative communications routes and improving throughput and reliability, Smith said. It was built around a concept known as Transmission Groups (TG).

TGs are logical parallel links that users can customize from one node to another, he said. SNA employs "dynamic load leveling" among them, so each carries nearly the same load — a capability that perseveres automatically in case any of the lines should go down. But the capability is not limitless, and

(Continued on Page 52)

Harris DDPs Fitted for SNA

DALLAS — Harris Corp. has made several of its distributed data processing (DDP) systems fit to run as IBM 3776 and 3777 controllers by giving them Systems Network Architecture (SNA) compatibility.

The 377x/SNA emulator — previously available with Harris 1600 series remote batch terminals — is now available with the 1650, 1660 and 1670 DDP systems, for simulation of communications capabilities of IBM 3776-1, -2 and -3 controllers as well as the 3777-1, -3 and -4.

The 1600 series DDP systems run at 2,400-, 4,800-, 9,600- and 19.2K bit/sec. The 377x/SNA emulator brings to the systems support for up to 10 logical units and simultaneous communications with multiple hosts under SNA and IBM's Synchronous Data Link Control (SDLC) protocol.

The emulator runs as a single job under the 1600s' Extended Communications Operating System (Ecos), which supports multiple jobs concurrently under various remote job entry protocols. With the emulator, a 1600 DDP system can run in the SNA/SDLC mode while communicating under the Hasp/Multileaving protocol.

Harris called this capability "a significant advantage for users installing SNA who wish to continue to use existing bisynchronous equipment and application programs during a conversion period or for extended parallel operations."

The vendor's 1600 series DDP systems can now accommodate the following protocols: IBM SNA/SDLC, Hasp/Multileaving, 2780, 3780, 3741 and 5230;

(Continued on Page 52)

From Tymnet

Mini-Engine Out for Packet Nets

WASHINGTON, D.C. — Tymnet, Inc. has unveiled three versions of its Tymnet Mini-Engine communications processor for packet network applications.

Both the Mini-Engine 1 and Mini-Engine 2 provide asynchronous terminal interfacing at selected speeds from 110- to 1,200 bit/sec or 300- to 4,800 bit/sec. Both support synchronous network lines at speeds to 9,600 bit/sec, the vendor said.

The Mini-Engine 1 will support up to 32 terminals and two network lines; the Mini-Engine 2 will support up to 64 terminals and 16 network lines, according to Tymnet.

The Mini-Engine 3 was reportedly designed to run under Tymnet's Internally Switched Interface System (Isis) software and can be configured for applications such as IBM 3270, X.25 (non-HDLC) and 2780/3780 Hasp. It will support 16 synchronous lines at speeds up to 9,600 bit/sec, the firm said.

Base prices for the products are Mini-Engine 1, $22,000; Mini-Engine 2, $29,100; and Mini-Engine 3, $32,700, Tymnet said from 20665 Valley Green Drive, Cupertino, Calif. 95014.

ISI 387 Replaces 3287

ANN ARBOR, Mich. — A plug-compatible and less expensive alternative to IBM's 3270 printer is available from Interface Systems, Inc. (ISI) with all options of the 3287.

Called the ISI 387, this 180 char./sec printer reportedly offers higher throughput and superior forms handling capability than IBM's model. Standard features are said to include boldface expanded character printing, "3287-like" operator controls and support for IBM's Synchronous Data Link Control protocol.

The ISI 387 is compatible with IBM's 3274-6 and 3271-2 cluster controllers, a spokesman said. The $4,250 printer can be delivered within 90 days of order, he added.

More information is available from Interface Systems, Inc., 462 Jackson Plaza, Ann Arbor, Mich. 48103.

CRT Terminal Subsystems Brought Out by Honeywell

WALTHAM, Mass. — Two general-purpose, low-cost CRT terminal subsystems that are said to combine terminal and printer cluster capabilities with communications have been announced by Honeywell, Inc.

The VTS7710 small-cluster and VTS7740 large-cluster subsystems feature newly designed firmware and keyboard/display components, the vendor said, and are usable with Honeywell's full range of small-, medium- and large-scale computers. They are also reportedly application-compatible with the firm's older VIP7700, 7700R and 7760 cluster terminal systems.

The two units include microprocessor-driven terminal controllers that support up to four or eight Honeywell keyboard/display terminals respectively, as well as four or eight independently addressable printers — all serving a single host computer.

Both systems feature a keyboard/display unit with a 12-in., 24-line by 80-char. CRT and separable 76-key Ansi II keyboard. The synchronous cluster terminals provide transmission rates of up to 9,600 bit/sec.

A typical VTS7710 subsystem, including one controller, four CRT terminals and one 160 char./sec printer, costs $15,575 plus a monthly maintenance fee of $175. A typical VTS7740 subsystem, including one controller, one diskette, eight CRT terminals and one 160 char./sec printer, costs $27,250 plus monthly maintenance of $246, the vendor said.

Honywell is located at 200 Smith St., Waltham, Mass. 02154.

SNA Version Three Praised

(Continued from Page 51)

users should carefully apportion line traffic beforehand to prevent overloading, he warned. Up to eight separate TGs may be specified.

If both satellite and terrestrial lines are in use, Smith suggested, "You might just as well use two satellite channels because the propagation delay [earth-to-satellite-to-earth transmission time] is going to kill you."

Even Version Three has its limits, he pointed out. One TG will not automatically pinch-hit for another when a node goes down. As a result, the conversation, or "session" to put it in IBM terms, is terminated and can be renewed only after manual allocation to an alternative TG.

SNA now also offers three priority levels, a number Smith expressed dissatisfaction with. In ascending order, they go from batch or file transfer to electronic mail to interactive.

The Communications Management Configuration is another SNA improvement, the consultant said. It places the central network operating system in a single host processor, but makes it available to "stand in" for other hosts without having to reside in them. Such an arrangement reduces the costs of interhost communications.

ISO Efforts

Charles Bachman, vice-president in charge of applied research for Cullinane Database Systems, Inc., spoke about the work being done by the International Standards Organization (ISO) to establish an Open Systems Interconnection architecture that would allow all systems and terminals to interconnect, no matter what their differences.

As a former chairman of the ISO subcommittee on interconnection, he was well versed on the topic, which has been the cynosure of international controversy and concern.

Bachman, introduced as "The Father of Data Base Management," extolled the virtues of the ISO's latest model, saying it would facilitate network construction and reduce prices by allowing users to work with inexpensive, off-the-shelf components.

The latest version is actually the fourth model hammered out by the ISO since it started work on the project in 1978. "I would say the people who work on the committee are very impatient," he said.

The fourth version was submitted to the 14 participating countries for their inspection late last year and, although many of them offered amendments or deletions, Bachman said, except for the UK, all agreed the model was "moving in the right direction."

In order to move from "draft standard" status to "proposed standard" status, a model must first survive two rounds of voting. After that, he said, the model was like the floor plan of a house, which must then receive its interior design. More than 100 people from the 14 participating countries as well as observers from the International Consultative Committee on International Telegraph and Telephone and the European Economic Community have scrutinized the document toward that end.

Recommendations for the seven layers envisioned by the model have already been made for the lower, or "handshaking," layers and are expected for the middle, or transmission, levels by 1982. The highest terminal-to-computer levels lag behind the others, he noted.

Harris DDPs Fitted for SNA

(Continued from Page 51)

Sperry Univac 1004 and NTR; Control Data Corp. 200 UT; Honeywell, Inc. G115/355; and Burroughs Corp. DC1100.

For $126,726, the user can purchase a Harris 1600 series DDP system under SNA/SDLC and Hasp/Multileaving along with: a 300-card/min card reader; 600-line/min chain printer; 24M-byte Winchester disk drive; 9-track, 800 bit/in. tape drive; CRT console; and 10 1,920-char. CRT terminals. That configuration can be leased for two years at $3,669.

The Data Communications Division of Harris is at 16001 Dallas Parkway, Dallas, Texas 75240.

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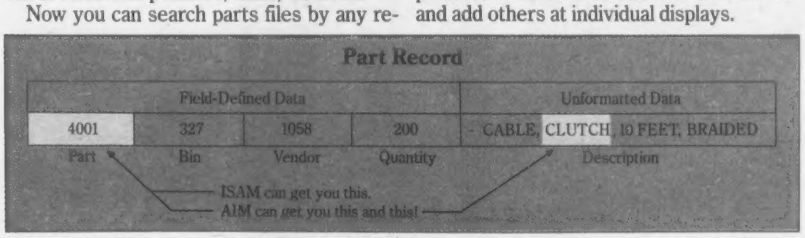


DATAPOINT

Sync/Async Buffer Bows

DANBURY, Conn. — A synchronous/asynchronous buffer that transmits asynchronous data through synchronous modems or synchronous digital facilities operating in either point-to-point or multipoint network applications at data rates up to 9,600 bit/sec is being offered by General Datacomm Industries, Inc.

The SAB-1 accommodates 10-bit Ascii data at seven user-selectable data rates, the firm said. The unit operates in full-duplex, half-duplex or simplex over dial-access or over private lines in dedicated point-to-point or multipoint applications. The buffer automatically manages the flow of data and with less than 2.5-char. end-to-end delay with no buffer overflow, it offers fast response time, the firm stated.

The SAB-1 is compatible with asynchronous EIA RS-232C or CCITT V.24/V.28 modem or digital service, according to the vendor.

SAB-1 costs $295 with discount prices in quantities over 10, the vendor said. More information is available from General Datacomm at One Kennedy Ave., Danbury, Conn. 06810.

Supermux Family Gains Two Multitrunk Versions

CHERRY HILL, N.J. — Infotron Systems Corp. has introduced two multitrunk versions of the Supermux 680 statistical multiplexer, which debuted last year.

The original Supermux 680, now called the Supermux 680 I, cuts data communications costs by concentrating up to 32 synchronous and asynchronous input lines over a single 9,600 bit/sec output link, a spokesman said. The new Supermux 680 II boosts capacity by transmitting multiplexed data over two trunks, not just one.

With Infotron's 680s, statistical techniques limit transmissions to active data inputs, thus conserving bandwidth, the spokesman explained. The combined aggregate speed of the asynchronous inputs may be 38.4K bit/sec.

Synchronous inputs, statistically multiplexed on the same output line, may boost aggregate speed to 172.8K bit/sec.

With the Supermux 680 II, dual trunks allow more locations to be linked. With the multiplexer, single-trunk units in two cities may collect data for a dual-trunk unit in a third city.

The second new multitrunk 680, called the Supermux 680 III, uses three trunks to increase capacity and provide even more networking combinations, the spokesman stated. With this unit, triple-trunk units in four cities may be linked together so each has a direct link to the other three cities. Triple-trunk units in three cities may be used to collect data from a combination of double- and single-trunk models in other remote locations.

Input Units

As many as 14 inputs may be assigned to one trunk of the Supermux 680 II; the second trunk may handle up to 12 more. Six of the inputs to each 680 II trunk may carry synchronous data.

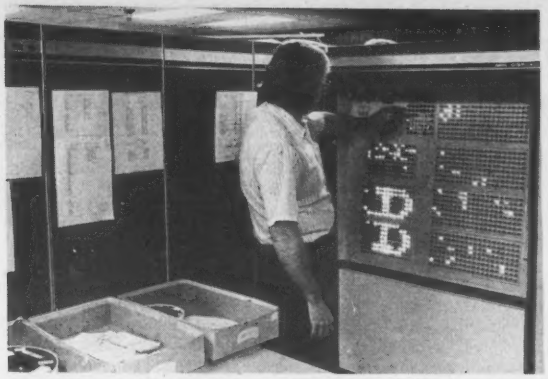
As for the Supermux 680 III, two of the three 9,600 bit/sec trunks in that multiplexer may be assigned up to six inputs; the third trunk can handle up to eight inputs.

The aggregate speed of all asynchronous inputs to the Supermux 680 III may be 115.2K bit/sec. Four of the inputs to each trunk may carry synchronous data.

The Supermux 680 single-, dual- and triple-trunk units are also offered with an optional band splitter that provides more network combinations. The band splitter combines up to four synchronous inputs over a single 19.2K bit/sec line. One or more of these inputs may be outputs from Supermux 680 units.

The Supermux 680 I, 680 II and 680 III cost $3,000, $4,100 and $5,200 per end, respectively. Dual asynchronous channel adapters are offered for another $350 per end.

Infotron Systems is headquartered at Cherry Hill Industrial Center, Cherry Hill, N.J. 08003.



An operator at the Mid-Iowa Computer Center checks the memory display on one of the dual B6000 CPUs.

A total of 18G bytes of storage are provided by 18 disk drives; storage has expanded since more operations have gone on-line.

Iowa System Worth Its Weight in People

Special to CW

DES MOINES, Iowa — Officials here at the Mid-Iowa Computer Center, an educational service bureau, tend to measure the worth of their computer system in terms of numbers. Not the numbers that correspond to access speeds and terminal capacities, but the numbers that tell how many people are needed to run the computer.

For instance, in 1972 the center provided DP services to about 30 school districts with a staff of around 28 people.

Today, the center serves 137 local school districts, 15 educational agencies and three parochial schools, but has only increased its staff by two.

Rather than relying on any kind of municipal sleight-of-hand, the nonprofit organization accomplishes this feat by using its Burroughs Corp. B6700 computer. The dual-processor computer system has nearly 4M bytes of main memory, 18 disk drives with a total of 18G bytes of storage, four 1,600 char./sec tape drives, two printers, a card reader and a card punch.

The system contains data on or provides service to about one-third of the entire student population of Iowa, according to Don Andrew, head of the educational DP cooperative.

Forty-five of the agencies served by the center have data entry terminals in their offices, Andrew explained. Those that are on leased lines have CRT terminals, while those on the system's dial network use a variety of terminals. All data is input into the mainframes interactively and in an on-line basis.

One reason the center can handle such a wide area and DP workload with a permanent staff of 30 people is that the center uses budgeted contingencies — or an army of extra people — for peak periods. For

(Continued on Page 56)

Burroughs Document Processor Out

DETROIT — Burroughs Corp. has announced a three-model family of intelligent document processing systems reportedly suited for both centralized and decentralized processing environments in financial institutions.

The S6000 comes with its own memory, high-speed processors and software. It can operate as a free-standing system or be attached to a host processor, Burroughs said.

The S6001 can be used by smaller banks using the Burroughs B90, B900 and B1900 processors with the firm's CMS Bank Management System software. The unit can also be used as a high-speed station complementing the S3000 series of document processors, the vendor said.

The S6002 and S6003 models can be used alone or in clusters and can operate as a free-standing system or with a host processor. The units perform reading, sorting, data capture, correcting and fine sorting functions plus a variety of reporting features, according to Burroughs.

Typical users of the larger models are commercial banks and holding companies, the vendor said.

The S6000 can have 12, 24 or 36 sort pockets in 12-pocket modules. Each module has six pockets on each side of the document track, the vendor said.

S6000 units cost from $62,000, the vendor said from One Burroughs Place, Detroit, Mich. 48232.

Univac 1100 Series Users Gain Cache Disk Subsystem

CHATSWORTH, Calif. — Amperif Corp. has announced a cache disk memory system compatible with Sperry Univac's 1100 series processors. The disk subsystem allows CPUs to access stored data four times faster than conventional media.

The cache disk subsystem offers a 9 msec average CPU access time and an average hit rate of 85% in finding information in cache memory. However, the firm noted that figure is application-dependent. Overall disk access performance is about 400% faster than direct disk access, the vendor said.

Standard features include a 333K word/sec transfer rate, a write-through mode, a cache bypass, write inhibit feature and a 2-bit cache memory correct, the vendor said.

The system operates with Uni-

(Continued on Page 56)

Graphics System Runs CAD/CAM

SALT LAKE CITY, Utah — Evans & Sutherland, Inc. has announced the PS300, a distributed graphics system designed for computer-aided design and manufacturing (CAD/CAM) and other graphics applications.

The PS300 is a self-contained system that reportedly can operate at any distance from a host processor and on a variety of host processors for application programs. Features include incremental building and changing of data structures with all object references by name, interactive manipulation of objects by commands that allow linking of devices and objects through a library of functions and a calligraphic display system than can compute and display images of up to 95,000 vectors per frame. The display system features include translation, scaling, clipping and depth cuing, the vendor said.

The PS300 offers between 256K- to 4M bytes of memory and can be equipped with up to four monitors. Available interactive devices include an 11-in. tablet, eight control dials, a free-standing alphanumeric keyboard with 12 function keys and a keyboard option that provides alphanumeric LEDs, the vendor said.

Systems cost from $69,500, the vendor said from 580 Arapeen Drive, Salt Lake City, Utah 84108.

Graphics Display Terminals Out

•From MQI

MOUNTAIN VIEW, Calif. — A graphics display terminal said to offer point-to-point control of input and feature a detached keyboard has been announced by MQI Computer Products, Inc.

The Autograph 150 also features 250 by 512 resolution, selective graphics erase, white-on-black or black-on-white display, 24 lines of 80 Ascii alphanumeric characters, full editing capability and protected fields.

The Autograph 150 is priced at $2,590 with 30-day delivery from MQI Computer Products, 2615 Muller Ave., Mountain View, Calif. 94041.

•From Ramtek

SANTA CLARA, Calif. — A full-featured desktop graphics terminal with high-resolution raster scan color graphics designed for business, process control, scientific data analysis and government and military applications has been announced by Ramtek Corp.

The RM-6211 includes a detachable optional keyboard and can communicate with any host CPU via an RS-232C interface while offering resolution of 640 by 480 pixels operating at 30Hz, the vendor claimed.

Four refresh memory planes controlled by a user-programmable video look-up table permit the simultaneous display of up to 16 colors selected from a palette of 64, the company said.

With delivery time of 90 days, the RM-6211 color graphics terminal is priced at $5,995 from Ramtek Corp., 2211 Lawson Lane, Santa Clara, Calif. 95050.

Iowa Data Center Weighs System Worth in People

(Continued from Page 55)

example, grade reporting, which is a three-week peak occurring four times during the school year, requires more data entry personnel than normal.

To stay afloat during these times, the center maintains a trained cadre of part-time key entry operators who are available on short notice. When the peak hits, these operators work two shifts until the work is finished, then go home until the next peak time, Andrew said.

Every two years, when the school district census is taken, the part-timers are again put to work until the job is finished, Andrew pointed out.

"Instead of trying to maintain a permanent staff large enough to cover those peaks, we rely on the part-time people. They are experienced and know our policies and keying formats, and settle right in to work."

While equipment costs and capabilities were important factors in the center's decision to acquire the Burroughs system, its impact on the center's productivity and long-term efficiency weighed heavily in the decision process, Andrew said.

In its search, the center sent a request for proposal to every major computer vendor, specifying three criteria: how much the system would cost, how much systems software the vendor had to assist the center, and how large a programming staff would be needed to support the system. The last item was particularly important because the center wanted to keep the staff number down, Andrew stated.

At the Wire

When two competitors were at the wire, the center selected Burroughs because it had specified the least number of people necessary to operate the computer.

Currently the center has an average programming staff of about five people and four operators. The center runs three shifts per day with one operator per shift. And the system has an average uptime of about 98% to 99% on prime shift, Andrew claimed.

"We also find that we can take people with little data processing knowledge and train them in about three weeks," the executive director added.

Power Conditioner Bows

SAN DIEGO — Single-phase power conditioners with a choice of five output receptacle panels have been announced by Topaz, Inc.

The conditioners remove electrical noise from power lines and regulate voltage to within design tolerances.

The power conditioner is priced at $2,360 with an output receptacle panel from Topaz.

The company is located at 3855 Ruffin Road, San Diego, Calif. 92123.

Univac Gets Disk Cache

(Continued from Page 55)

vac 1100 series executive software 36R2B and above and the semiconductor cache eliminates most of the mechanical delays associated with disk storage, the vendor claimed.

The subsystem also performs cache management functions, allowing the most active data to migrate to the cache.

A microprocessor controls cache memory hierarchy, sorting a continually updated set of the most recently used disk tracks, the vendor spokesman said.

The basic cache disk system memory is 250.8K words, which is expandable up to 1,003.4K words. The system is designed as a disk interchange medium only, not as a solid-state disk, the vendor said.

A basic system costs $272,000, the vendor said.

The company is located at 21345 Lassen St., Chatsworth, Calif. 91311.

Mini Bits

Single-Chip Processor From Zilog Runs Basic

CUPERTINO, Calif. — Zilog, Inc. has announced a single-chip processor that executes the Basic programming language. The chip can be used for software development.

The Z8671 is similar to the rest of Zilog's Z80-based chips, but it adds a Basic interpreter masked onto the chip's 2K-byte internal read-only memory, the vendor said.

The unit costs $24.63 and is available to the end user, the firm said from 10430 Bubb Road, Cupertino, Calif. 95015.

Deltec Power Systems Can Sense Overload

SAN DIEGO — Two uninterruptible power systems with 1,200 VA and 1,800 VA output designed for use in telecommunications, process control, business and small office applications has been announced by Gould-Deltec, Inc.

The models 1220 and 1820 can be supplied in a single freestanding enclosure that includes the power system, batteries and a static transfer switch that will switch to ac bypass when it senses an overload, the vendor claimed.

The 1220 is priced at $2,695 and the 1820 at $3,160 from Gould-Deltec, 2727 Kurtz St., San Diego, Calif. 92110.

Codata 488 Controller Links Multibus, CTS

SUNNYVALE, Calif. — Codata Systems Corp. has introduced an IEEE Standard 488 controller to link Multibus-compatible units with the company's CTS series of desktop computers.

The controller allows the user to select CPU configurations, signal conditioners, graphics display generators, digital and analog I/O and an assortment of memory configurations, the vendor claimed.

Gateway is priced at $2,300, the vendor said. Codata Systems Corp. is located at 285 N. Wolfe Road, Sunnyvale, Calif. 94086.

Gets Distributed Node

Wang Beefs Up VS Family

LOWELL, Mass. — Wang Laboratories, Inc. beefed up its VS processor family by adding a distributed processing node, a series of tape drives, a high-speed printer, a daisy printer, a serial device switch, a card reader and a data entry keyboard option.

The distributed processing node, the VS-50A, was designed to meet the need for increased disk storage space and distributed processing power in remote locations. The unit is an enhanced version of the VS-50, originally introduced as an entry-level processor.

The basic VS-50A configuration includes 128K bytes of main memory, a 2246S workstation, a 90M-byte fixed or removable disk drive, a 22V07-1 serial IOP and a 22V18 IOP. It costs $42,000 and is available for immediate worldwide deliveries, Wang said.

The tape drives, called the 2219V series, consists of a tape transport mechanism and a tape formatter. The tape drives support 6,250- to 1,600 bit/in. dual-density tape and 6,250-, 1,600- and 800 bit/in. tridensity tape, the vendor said.

Wang said the announcement provides greater compatibility between the Wang VS and mainframe environments employing 6,250 bit/in. tape formats. The 2219V series provides three times the storage capacity as former Wang tape drives.

Domestic deliveries of the 2219V will begin in December with international deliveries starting next April. The tape drives range in cost between $24,000 and $49,000, the vendor said.

The 5575 band printer can print up to 136 columns on single and multipart continuous-form paper. The unit operates at print rates of 850- or 1,100 line/min., depending on the print band in use. The 5575 costs $29,500 and is available for domestic and international delivery in August, Wang said.

In addition, Wang unveiled the 2281WR, a daisywheel printer, and the 2281WCR, a wide-carriage version. The 2281WR, which prints at an average rate of 30 char./sec, is a bidirectional impact printer designed for high-quality printing at a remote location.

Both printers accommodate a variety of print wheels. The 2281WR 30 char./sec printer costs $4,500 and the 2281WCR costs $6,000. Both printers are available for immediate delivery, Wang said.

Also announced was the SW16 serial device and SW04 disk switch. The SW16 is a manually operated, nonelectronic switching mechanism that allows the user to switch up to 32 serial workstations or printers between two VS processors. The unit provides uninterrupted operation of one or more serial

(Continued on Page 59)

HP Adds Thermal, Impact Printers

PALO ALTO, Calif. — Hewlett-Packard Co. has announced a line of thermal and impact printers for its desktop and personal computer systems.

The thermal printers include the HP-IB interfaces and national character sets. Serial and parallel interfaces are optional, the vendor said.

An entry-level printer, the HP 2671A features 120 char./sec bidirectional printing, a full 128-char. Ascii set, a line-drawing character for creating forms and a Roman Extension set for creating national characters. The printer costs $1,095, the vendor said.

HP also announced the HP 2671G graphics terminal printer. The unit includes all the features of the HP 2671A plus high-resolution raster graphics. The 90 dot/in. resolution is designed for applications requiring text graphics printing and costs $1,295, HP said.

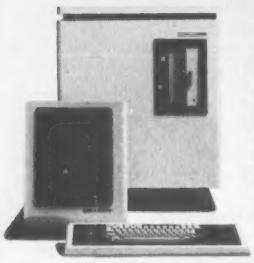
The HP 2673A graphics terminal printer has the same capabilities as the previous models. However, the unit includes autocentering, windowing and offset features. The unit costs $1,895, according to the vendor.

A dot matrix impact printer, the HP-82905 is designed to run with the HP Series 80 personal computer systems. The unit features a graphics mode that can print a dot-by-dot version of CRT graphics onto hard copy. The unit costs $945, the vendor said.

The HP-82905 can be ordered July 1, with deliveries scheduled to begin Aug. 1. The thermal printers can be ordered now and deliveries begin in July. The HP 2673A will be delivered in August, the vendor said from 1501 Page Mill Road, Palo Alto, Calif. 94304.

The HP 82905

DOMAIN PROCESSING



Apollo Computer has finally put an end to the computer compromise.

With the introduction of Apollo's DOMAIN, you can now get both the resource and data sharing capabilities of today's best timesharing systems with all the performance and responsiveness of a dedicated mini—all in one cost-effective system.

DOMAIN (Distributed Operating Multi-Access Interactive Network) processing is a new and dramatically different approach to computing. It's a high performance local network of dedicated computers in a distributed environment. Its unique architecture is designed to allow each user maximum autonomy within the network, while retaining the vital communications and resource sharing capability among every user.

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A high level of predictable performance, including a VLSI CPU (with 32-bit architecture) dedicated to each user on the network, executing in a 16 megabyte demand paged virtual memory.

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A network level modularity, providing a system with a very high performance level, a wide range of growth capability, and a vast improvement in system reliability and availability.

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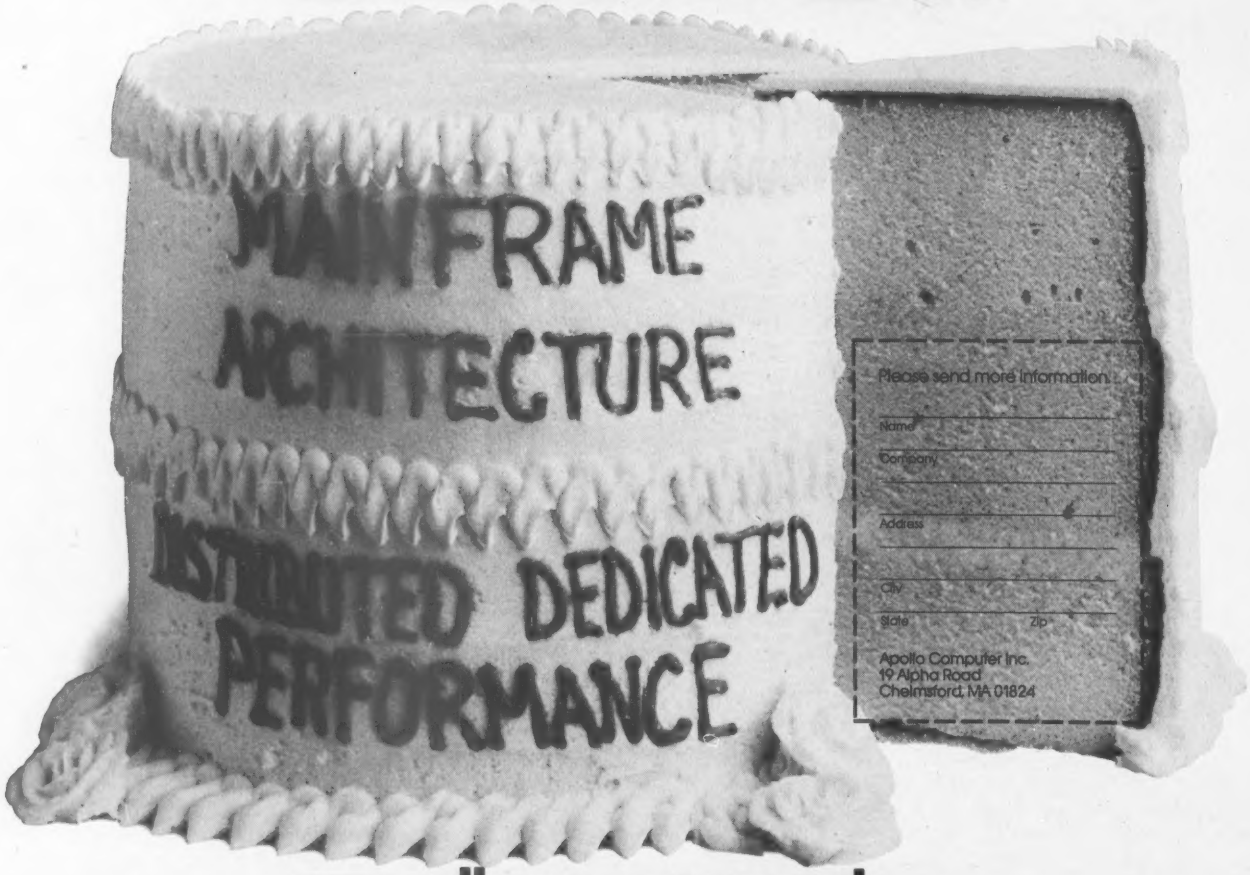
By configuring dedicated CPU's in a network architecture, Apollo's DOMAIN really does let you have your cake and eat it too.

Now you can have your cake and eat it too.

For more information on DOMAIN processing and Apollo Computer, simply fill out and return the coupon below.



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Apollo Computer Inc.
19 Alpha Road
Chelmsford, MA 01824

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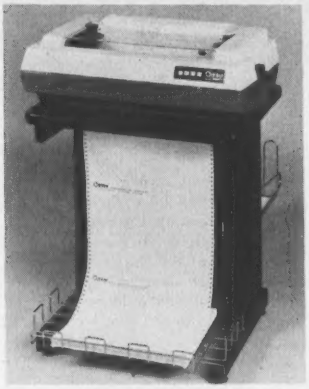
Apollo Computer Inc., Headquarters: Chelmsford, MA: (617) 256-6600; District Offices: Mountain View, CA: (415) 967-3231; Edina, MN: (612) 835-4541; Wayne, PA: (215) 964-8510; Dallas, TX: (214) 239-8528.

Series 6010 Matrix Printer Guards Against Data Loss

HAUPPAUGE, N.Y. — The Series 6010, a dot matrix impact printer that provides safeguards against loss of data with a 2K-byte standard message buffer, expandable to 4K bytes, has been introduced by Qantex Division of North Atlantic Industries.



Qantex Series 6010

The standard 2K bytes allows printing of a full CRT screen without restraint pauses, Qantex said. The printer can accept 80 more characters after the generation of a restraint signal.

The Series 6010 is microprocessor-controlled and operates at print speed of 150 char./sec with a 9 by 9 dot matrix. The printer is available with a Centronix Data Computer Corp.-compatible parallel or an RS-232 serial interface operating at rates up to 19.2K bit/sec. A rear-panel switch permits choice of active or passive 20 mA current loop.

The Series 6010 costs $1,550 with parallel interface and $1,580 with serial interface. Qantex can be reached at 60 Plant Ave., Hauppauge, N.Y. 11787.

Wang Beefs Up VS Family

(Continued from Page 57)

devices used in place of the original VS system. The SW16 costs $3,000 and deliveries will begin in September. International deliveries will begin in November, Wang said.

The SW04 disk switch is a dual-porting option available on 75M- and 288M-byte VS disk drives. It allows two VS processors to be connected to a single disk drive, which Wang says speeds up system restoration. The option costs $4,000 and will be available in August with international deliveries starting in November, Wang said.

The 2244V card reader is a 300 card/min reader capable of reading a standard 80-col tabulating card. Card information is transmitted to the VS processor asynchronously over a null modem using the 22V06 communications protocol. Domestic deliveries begin immediately and international deliveries will start in September. The unit costs $7,000, Wang said.

Wang also announced a data entry keyboard as an option on the VS 2246S workstation. It offers an arrangement of keys similar to the 029 keypunch, as well as the option of a reversed numeric keypad. Workstations equipped with the keyboard cost $3,500, according to Wang.

The vendor is located at One Industrial Ave., Lowell, Mass 01851.

'Baseball? Heck No . . . I'm Into Little League Electronics.'

Floppy Subsystem Appears As Punched Tape Peripheral

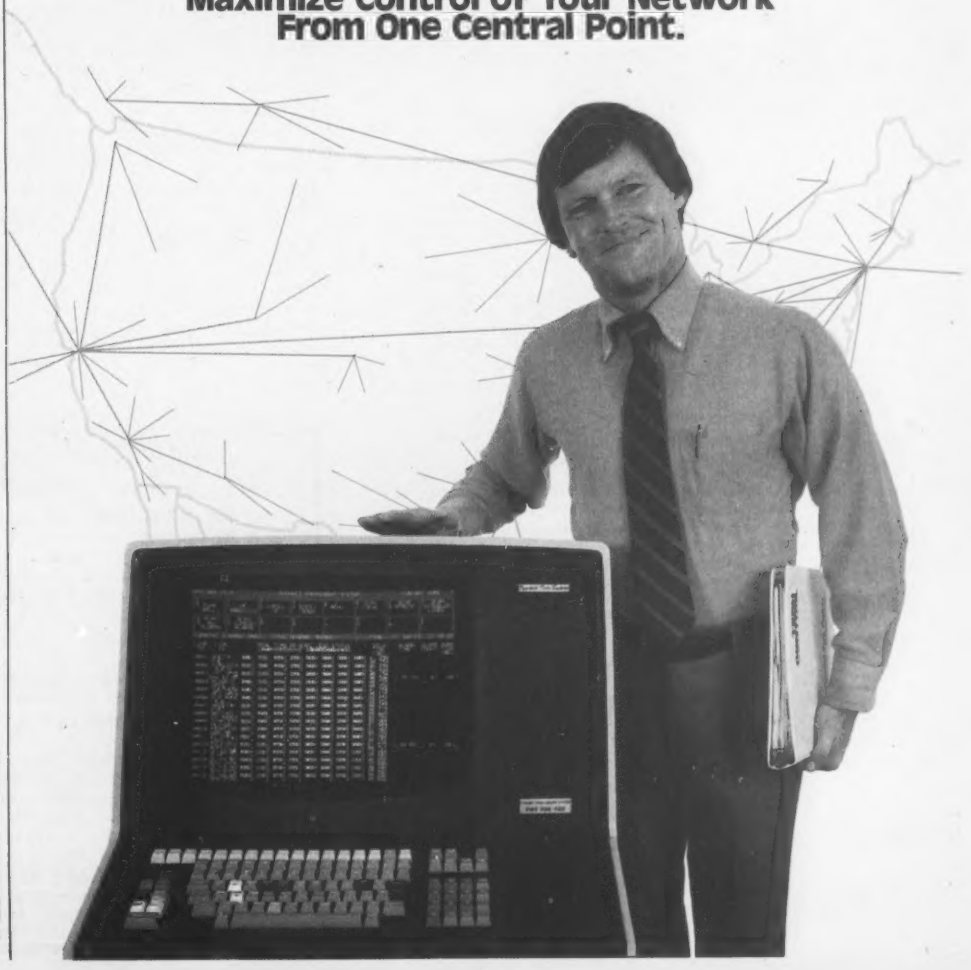
NEWPORT BEACH, Calif. — Excell-O Corp.'s Remex Division has announced a line of flexible disk subsystems that appear to the host processor as punched tape peripherals.

The units reportedly provide the high-speed data transfer, media handling and data storage of a flexible disk drive while operating with existing punched tape software and system configurations. They include microprocessor control, one or two 5¼-in. flexible disk drives, a power supply and parallel or optional serial interfaces, the vendor said.

Single-drive read-only models are available as well as read/write models with one or two drives, the vendor said.

Flexible disk drives used in the sytem are low-profile 5¼-in. media models 2¼-in. high. The drives record in single density providing 87K bytes of data per diskette storage, which is equivalent to 725 ft of punched tape. With the serial interface, transmission rates of up to 9.6K byte/sec can be achieved, the vendor said.

The unit costs $1,895 for a single-drive read/write combination system, the vendor said. Remex may be reached through P.O. Box C19533, Irvine, Calif. 92713.



TEI Issues Multiuser System For Medium-Size Businesses

HOUSTON — A multiuser computer system for medium-size businesses and for users upgrading present multiuser systems has been announced by TEI, Inc.

The initial offering of the System/48 accommodates up to eight interactive users and has 20M bytes of Winchester disk storage, the vendor said.

The system contains a proprietary structure of multiple application processors and one or more distributed resource processors that allows an optimal combination of data base management, file and peripheral resources and application processing, the company said.

The Datamagic II data base management system provides a screen formatter, report generator, edit, update and query processor packages, the vendor said.

A System/48 configuration for eight users is priced at $53,000 from TEI, Inc., 5075 S. Loop E., Houston, Texas 77033.

Systems Based On DEC LSI-11

CLARK, N.J. — The Ultimate Corp. has announced two microcomputers that are based on the Digital Equipment Corp. LSI-11 processor.

The Model 1000 consists of Release 10 of the firm's Ultimate operating system, the Ultimate 1000 peripheral processor, an LSI-11 processor, 64K bytes of main memory, 10M bytes of fixed-disk storage, a high-speed cartridge tape drive, a printer port and three communications ports. The unit costs $29,000, the vendor said.

The Model 2000 consists of Release 10 of Ultimate, the Ultimate 2000 peripheral processor, an LSI-11 processor, 64K bytes of main memory, 33M bytes of fixed disk storage, a high-speed microstreamer tape drive, printer port and three communications ports. The system costs $33,500, the vendor said from 342 Madison Ave., New York, N.Y. 10173.

New World Adds Winchesters

COSTA MESA, Calif. — Five models of 5¼-in. fixed and/or removable Winchester cartridge drives have been introduced by New World Computer Co.

The five models range from the low-cost Model 2/0, with 2M bytes of fixed storage, to the Model 4/4, with 4M bytes fixed and 4M bytes removable storage. The removable cartridge is available in 2M-byte and 4M-byte versions in a hermetically sealed package equipped with multiple-head assembly, media and actuator positioner.

All five models are powered by dc brushless motors and can be operated from standard +12V, +5V minifloppy power supplies or from a single 12V supply.

Prices start at less than $500 for the Model 2/0 and less than $1,200 for the Model 4/4, the vendor said. A field upgrade kit can bring New World fixed-storage Mikro-Discs up to fixed/removable status for $40.

New World is located at 3176 Pullman St., No. 120, Costa Mesa, Calif. 92626.

Printer Features Self-Testing

ORANGE, Calif. — MDB Systems, Inc. has announced a line printer controller that features a self-testing capability. The product, which uses an LSI-11-based microprocessor, will interface with virtually any printer on the market, the vendor claimed.

The two self-test features are Printest, a switch-activated feature that causes the controller to transmit to a connected printer a prescribed pattern that will check all features of an operational printer except VFU functions. The Printest mode can be used in local or remote locations, the vendor said.

A loopback function is also available that allows the controller to react to the host processor as a complete printer subsystem. This switch-activated mode allows troubleshooting without printer noise and wasted paper, the vendor said.

The controller is supplied with a 15-ft interconnection cable for the printer and costs $475, the vendor said from 1995 N. Batavia St., Orange, Calif. 92665.

Mini Includes Mark III Unit

IRVINE, Calif. — Minicom Systems, Inc. has announced the Series 32/64 minicomputer, based on the Point 4 Data Corp. Mark III 16-bit minicomputer.

The Series 32/64 includes a 64K-byte Mark III processor, a four-channel DMA multiplexer, disk drive controller, 32M bytes of disk storage, a 1,920-char. CRT terminal, an 80 char./sec printer and a cabinet. The system can be used for data processing or word processing applications.

A typical configuration costs $14,995 including the operating system and one software application. Applications include accounts payable, accounts receivable, general ledger and word processing, the vendor said from 606 N. Larchmont Blvd., Los Angeles, Calif. 90004.

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Carterfone's new family of Message Editing Terminals can improve the efficiency of private line networks without increasing costs or disrupting operations. The 7800's are specifically designed to reduce message input errors, speed message preparation and eliminate problems associated with electro-mechanical terminal equipment.

The 7800 family of private line terminals consists of 27 models which allow network managers to configure each user station to exact requirements. And, since all models are upwardly and downwardly compatible, network changes are easily implemented. Ideal for replacement of electro-mechanical teleprinters, or expansion of an existing network, the 7800's offer flexibility, adaptability and operator convenience.

The 7980 Transaction Terminal
The 7980 provides a cost-effective custom-programmable display terminal capable of performing stand-alone functions. Thus, it's ideal for a variety of applications in data-entry systems, multidrop communications networks, reservations systems and broad-based data transaction systems.

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H0-08R

Software Firms Unite to Fight Theft

By Lois Paul
CW Staff

GLENDALE, Calif. — Software companies have to make it loudly known that they are strong enough to defend their rights, according to Robin Robinson, president of the Association for Software Protection here (ASP).

The alternative, she said, is for software companies to be forced out of business as increasing thefts of their products push them into a losing competition with their own software at bargain basement rates.

Robinson, software protection director for Mini-Computer Business Applications, Inc. (MCBA), formed ASP in conjunction with Adrienne Webb of Digital Information Systems Corp. (Disc) and Dale Coleman of S&H Computer Systems, Inc. ASP is the culmination of an ongoing five-year effort by the three companies that develop and market Digital Equipment Corp.-compatible software to coordinate their efforts to end unauthorized duplication of their software products.

"Our software often is interrelated," Robinson said. "If there is an unauthorized copy, it generally involves all three of us." Now they are attempting to contact and join forces with other companies who have had similar problems. "We need to establish a network to increase the energies and efficiencies of those interested in defending software rights," Robinson said.

She cited the case of a company that purchased a one-use license from a software vendor, issued multiple copies of it, sold a leased computer and failed to

(Continued on Page R)

Now Stressing Integration

Cullinane: Out of One Product, Many

By Marcia Blumenthal
CW Staff

WESTWOOD, Mass. — John J. Cullinane compares the success of Cullinane Data Base Systems, Inc. to the miracle of the loaves and fishes.

The first product he built, back in 1968, was a report generator called Culprit. Cullinane had a difficult time selling it because it was hard to convince programmers to use another language. So out of Culprit he invented EDP Auditor, which made auditors independent of the DP department.

"What I couldn't sell for $10,000 before, I then sold for $20,000," he recalled.

Now president of a $30 million software firm, Cullinane has followed his original strategy of multiplying a single product into many with IDMS, a data base management product that has evolved to serve many needs of users.

Cullinane himself does not have a heavy DP background, but was given the opportunity back in the 1950s to oversee the computer operation of Arthur D. Little, Inc. After cutting his teeth on applications development projects, Cullinane, like other farsighted entrepreneurs who eventually started software firms in the late 1960s, saw an opportunity in selling multiple copies of the same software package.

Cullinane raised a half-million dollars to start his company by pounding the Wall Street pavement. Financially savvy, he took the risk of going public in 1978, the first pure-play software firm to make a foray into the equity market. Without counting the company's recent stock split, the company's stock has been trading in the $106 per share range.

CW Photos by M. Blumenthal

John J. Cullinane

Although Culprit and EDP Auditor are still major products, the big breakthrough for Cullinane came in 1973, when the firm acquired IDMS from B.F. Goodrich Co. and adapted it for the mass software market. "We were the last of the major data base management system firms to appear on the scene," Cullinane observed.

But being last has certainly not proven a drawback for the firm. With revenue and earnings growth averaging in the 65% annual range for the past few years, Cullinane finished its latest fiscal year April 30 with revenues of $29.3 million, up from $17.7 million last year. Earnings grew 87%, reaching $4.5 million or $1.77 per share, up from $2.4 million or 88 cents per share in the prior year.

Moreover, the firm has beefed up personnel significantly in the last year, with the number of employees growing from 212 last year to 340 at the present time.

Since acquiring IDMS, Cullinane has integrated a variety of capabilities into the original product — the Integrated Data Dictionary, which drives the system and acts as a central control facility; IDMS-DC, the teleprocessing monitor used with IDMS; and the recently introduced IDMS-Universal Communications Facility, which permits IDMS-based applictions to run under any teleprocessing monitor without modification.

While IDMS is a "production-oriented" system, geared primarily for complex, high-volume applications involving a lot of updating, Cullinane in the past couple of years has been paying more attention to providing easier user access to the system. Its On-Line English product is an example of this effort.

Moreover, the company is now exploring the development of a private data base facility. "The first approximation would be a personal data base that would be totally independent, but eventually many private data bases could grow to become part of the production data base because they do something useful," explained Charles W. Bachmann, newly hired vice-president of applied research.

And the upcoming Release 5.7 of IDMS, scheduled for first customer test in August, will feature presentation of data in a flat file manner, a method used in rela-

(Continued on Page 72)

Supershorts

Reynolds & Reynolds Co. has formed a subsidiary corporation to finance its customers' purchases of computers and related peripherals. Named Reyna Financial Corp., the new group is headquartered in Reynolds' Dayton, Ohio, offices.

— — —

Tymshare, Inc. has formally dedicated its newest computer center, a $15 million facility in Fremont, Calif.

— — —

TRI, of Cary, Ill., has announced it will soon become the eighth U.S. manufacturer of magnetic computer tapes.

— — —

Western Digital Corp. has reorganized its corporate and management resources into the formation of an Advanced Systems division.

— — —

Hewlett-Packard Co. has recently delivered its 6,000th HP 3000 computer system. The system went to Shell Oil UK.

Robert Goldman

Charles W. Bachmann

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Meet the new Xerox 820 Information Processor. It's a desktop computer that can help you with planning, budgeting, forecasting or just about anything else you do at your desk.

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June 19, 1981

Microcircuits Under Investigation

U.S. Accuses Fairchild of Improper Testing

By Robert Batt
CW West Coast Bureau

MOUNTAIN VIEW, Calif. — Fairchild Instrument and Camera Co. has been accused of supplying improperly tested microcircuits to federal government agencies.

A technical paper just released by the Defense Logistics Agency in Washington, D.C., said the company failed to carry out 100% testing of all its microcircuits before shipping them out to customers for use in applications such as missle and aviation systems. As a result of these claims, the company is under investigation by the Fraud Section Criminal Division of the U.S. Justice Department.

The Defense Logistics Agency, which is responsible for procurement of the components, said it was not known if any microcircuits had failed in service, but test failure rates of up to 19.7% had been recorded for some of the Fairchild devices.

The charges against Fairchild came at a particularly embarrassing time for the company. A year ago, Fairchild was found to have supplied millions of improperly tested transistors, and in February it was removed from the government's Qualified Products List because of uncertainty over the reliability of some of its components.

According to the Defense Logistics Agency, testing of the chips was done either on a sample basis, rather than the 100% testing required, or the test samples were smaller than regulations required. The agency said the improper testing took place for 1½ years beginning in January 1977 at Fairchild's South Portland, Maine, facility.

Because chips are incorporated into other devices, the agency said it was impossible to track down specific applications. Thus, the improperly tested devices could be in any number of electronic and computer-controlled systems. Fairchild has refused to comment on the number of chips involved.

There was also some confusion here last week concerning the role of the government agencies involved. Before it can use improperly tested chips, the government has to waive its normally stringent testing requirements if the chips are not to be returned to the manufacturer.

An agency spokesman said granting waivers was done at the discretion of individual contracting officers and because this function was not centrally coordinated, the number of waivers granted, if any, was not known.

New Companies

Medical Data Management, Inc., a company that provides financial management software systems to the health care industry, is located at 6240 Carlisle Pike, Mechanicsburg, Pa. 17055.

The Lynbar Group, a marketing organization for manufacturers of electronic equipment in the U.S. and Europe, has been formed at 3741 Ridgeview Road, Huntingdon Valley, Pa. 19006.

II, Inc. has recently been established to provide computer information services, specializing in data base/data communications and operating systems. It is headquartered at 2206 Glencourse Lane, Reston, Va. 22091.

Court Clears Codex

Racal-Milgo Patents Ruled Invalid

BOSTON — A U.S. District Court here has ruled Codex Corp. did not infringe upon Racal-Milgo, Inc.'s patents for high-speed modems.

The decision ended five years of litigation between the two firms that started in 1976 after a U.S. District Court in Kansas ruled the Racal-Milgo patents were valid and assessed damages of $2.9 million against United Business Communications, Inc., a customer of Codex.

Judge Walter J. Skinner ruled that a patent developed by Sang Y. Whang was invalid.

Moreover, the decision noted that Whang and Racal-Milgo attorney Stanley R. Jones "deliberately misrepresented the facts to both the district court of Kansas and to this court".

The decision included an award of attorneys' fees to Codex, which the company estimated were in the $1 million range. In making the award, Skinner said the evidence was very strong that Racal-Milgo's WU 2247 modem patent was not novel and that the defendants had tried to establish the novelty of the patent after the fact.

If Patent Stood

If the Racal-Milgo patent had been held valid, vendors such as Codex, AT&T and Rixon, Inc. would have been excluded from the high-speed modem market. Whang asserted his invention was a "pioneer patent" that applied essentially to all high-speed modems.

Besides vendors, users were theoretically liable for using equipment that had an invalid patent, a spokeswoman from Codex noted. She further said the firm had to rewrite some of their sales contracts so that users would be protected from paying damages if the patents were held valid.

Racal-Milgo said it would appeal the ruling, adding it could not comment further.

Expansions

Timeplex, Inc. has contracted to purchase 21 acres of industrial property in Largo, Fla.

Alpha Computer Solutions, an authorized Alpha Micro dealer, has moved to larger facilities in the First City Bank Building, Suite 103, 6330 W. Loop S., Bellaire, Texas 77401.

Comshare, Inc. has opened an office in Phoenix to promote and support local use of its IBM-based remote computing services. They are located at Suite A-209, 10640 N. 28 Drive, Phoenix, Ariz. 85029.

Midcom Consulting Services has moved to Suite 117, 1940 N. Tustin, Orange, Calif. 92665.

Concord Data Systems, Inc. has relocated its corporate headquarters to 442 Marrett Road, Lexington, Mass. The 5,000 sq-ft facility will house the marketing, research and development staffs.

Amperif Corp. will move to a 24,000 sq-ft facility at 21345 Lassen St., in Chatsworth, Calif. The additional space will accommodate manufacturing and development activities.

First Computer Corp. has announced plans to move to its new corporate headquarters in July at 645 Blackhawk Drive, Westmont, Ill. 60559.

GTE has announced plans for a $57 million manufacturing plant in Tempe, Ariz., as part of a five-year expansion program for its Microcircuits Division.

Productive Computer Systems, Inc. has completed its move to a larger facility at 233 N. Michigan Ave., Chicago, Ill. 60601.

Advanced Micro Devices, Inc. has broken ground for a multimillion dollar bipolar facility in San Antonio, Texas. Initial construction will consist of a 130,000 sq-ft facility housing two volume-production wafer-fabrication areas. Equipment will be installed in the first area in March 1982 with first production scheduled for August, 1982.

Telex Computer Products, Inc. has announced plans to expand the engineering and manufacturing facility at its Telex Terminal Communications Division in Raleigh, N. C., and construction will begin this summer on a 43,000 sq-ft addition.

Distributed Systems Corp., formerly of Chelmsford, Mass., and **Bedford Computer Systems, Inc.,** formerly of Bedford, Mass., have opened a facility at Interchange Industrial Park, 4 Liberty Way, Westford, Mass. 01886.

Data General Corp. has begun construction of a 257,000 sq-ft complex on a 107-acre site to serve as a field engineering support and administration center in Milford, Mass. Cost of this facility is estimated at $6.8 million.

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The new DECnet-20 offers task-to-task communications between nodes. Network file transfers. And network management.

For DECsystem-10 users, there's also the latest version of ANF-10. With features like multipathing for simultaneous, multiple communications between DECsystem-10s. And because terminals are on-line in the network only when characters are actually being typed, you can add more users and get better productivity from your entire network.

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We change the way the world thinks.

Software Firms Unite to Fight Product Theft

(Continued from Page 63)

deliver the promised software products. "The vendor is faced with a group of understandably irate users, many of whom have source code," she explained. Having been left "holding the bag," these users could easily be totally disenchanted with the software industry and unwilling to deal with it again, she added.

"I get a lot of calls from end users with problems caused partly because they did not ask the right questions beforehand to determine that the vendor of the software is licensed and authorized to issue packages," Robinson said.

"When the users are stuck and the software they have obtained does not work, they go back to their supplier and often find he has skipped town," she said.

Good Deal?

Disc's Webb said, "People call us and say, 'I bought your product, but I don't have a license for it.' " Her first question is, "Did you get a good deal on it?" If the answer is "yes," she said she has no pity for the user. "I tell them what they owe us and say it was not such a good deal after all," she continued.

Webb described a case pending in which the user owes Disc $24,000. This particular OEM sold 15 copies. "He is not too happy about the fact that we are charging him for the licensing. We are taking him to court. He may eventually file bankruptcy," she said.

Robinson said each company has different policies for dealing with the dilemma of the end user who, knowingly or not, has purchased unlicensed software. "We at MCBA do what we can to help them. But it still costs them money," she explained.

It is expensive to prosecute, she said, but when you win a case, "you promote the hell out of it to show you really will do something about it."

Future plans for ASP, according to Robinson, include a survey to determine what the major security problems are and a pooling of resources for an advertising campaign to educate end users.

Companies wishing to join ASP or to obtain more information can contact Webb at Disc, 6247 Fair Oaks Blvd., Carmichael, Calif. 95608.

Mergers & Acquisitions

Micronet, Inc., a Washington, DC-based management consulting firm, has expanded its staff and geographical coverage through the acquisition of majority control in **Kappa Systems, Inc.**

In a move to expand its position in the electronic control marketplace, **Cardkey Systems**, headquartered in Chatsworth, Calif., has acquired **Systematics, Inc.** of Piscataway, N.J.

Alpha Systems Corp. has reached a basic merger agreement with **OMT, Inc.** of San Jose, Calif.

State Street Bank and Trust Co. of Boston has entered into an agreement to purchase the major assets of **Banking Service, Inc.**, Lebanon, N.H., a data processing company providing on-line service to financial institutions.

Nickels & Dimes

Four-Phase Systems, Inc. has filed a registration statement with the Securities and Exchange Commission covering a proposed public offering of $40 million in convertible subordinated debentures due in 2001.

$ $ $

Bolt Beranek and Newman, Inc. (BBN) has sold its 503,729 shares of General Telephone & Electronics Corp. common stock in several recent market transactions. BBN received over $15 million from the sale.

$ $ $

Dicomed Corp. has filed a registration statement with the Securities and Exchange Commission for a public offering of 400,000 shares of common stock.

$ $ $

The board of directors at **Computervision Corp.** has authorized a two-for-one split of the company's common stock, to be effected in the form of a 100% stock dividend. Record date for the split was June 8, payable June 19. Computervision also completed the sale of its Cobilt Division to Applied Materials, Inc. of Santa Clara, Calif. Computervision estimated the loss on this sale at $2.5 million.

$ $ $

Comdisco, Inc. has registered with the Securities and Exchange Commission for a proposed offering of $50 million of convertible subordinated debentures due in 2001.

$ $ $

Concord Data Systems, Inc. has received $1.4 million of venture capital from a group of investors led by TA Associates of Boston.

$ $ $

IBM Credit Corp., a wholly owned subsidiary of IBM, announced that it has filed with the Securities and Exchange Commission covering a proposed public offering of $100 million of par notes due in 1986 and $150 million principal amount of zero coupon notes due in 1988.

$ $ $

The board of directors at **Data-Design Laboratories** has voted a four-for-three stock split to shareholders of record July 6 with an anticipated distribution date of Aug. 6.

Orders & Installations

Cable and Wireless Co., Ltd. has signed a major contract with the Chase Manhattan Bank of New York.

The U.S. Environmental Protection Agency has awarded System Development Corp. a contract valued at $11.7 million to provide facility management support for the National Computer Center, Research Triangle Park, N.C.

Cray Research, Inc. will install a Cray-1/B computer system in the University of Minnesota's Lauderdale Computer Center. The system is valued at $4.5 million.

Kranzley & Co., Inc., a subsidiary of Anacomp, Inc., has reached an agreement to implement its EFT 8500 Transaction Switching and Processing System on behalf of Fidelity Union Bancorporation, N.J.

Shell Co. has ordered a Cray-1B computer system from Cray Research, Inc.

National Data Communications, Inc. has been awarded a contract from Alexian Brothers Hospital in San Jose, Calif., for its total information system.

University Computing Co. has been awarded a contract to provide remote computing services to Exxon Nuclear Co., Inc., Richland, Wash.

Cullinane's Formula: Out of One Product, Many

(Continued from Page 63)
tional data base systems that are geared for easy user access, noted Robert Goldman, senior vice-president.

More recently the company has traveled in a major new direction, combining applications packages with IDMS. Cullinane got its Customer Information System up and running at the Hartford National Bank [CW, May 4] earlier this year. The vendor acquired the marketing rights to this package from Boatmen's National Bank in St. Louis.

Within the next nine months the company intends to integrate with IDMS a manufacturing system that it purchased from Rath and Strong for $1.1 million.

So strong is Cullinane's commitment to the applications area that it promised to use a significant amount of the nearly $15 million it raised through its second public offering of stock last fall to acquire products or buy applications software firms. "So far we've seen more products than firms," Cullinane said, adding that taking on two new applications per year would be an optimum pace.

Now that the the IDMS has been adorned with so many additional features, Cullinane no longer is too concerned with competition from IBM. "IBM today is less of a factor in data base technology than it was five years ago. Five years ago we lost four out of five sales to IBM, just the opposite of what is happening today.

No Easy Solutions

"It's not easy to solve problems related to software, no matter how big a company is today," Cullinane observed, referring to IBM's slowness in reacting to the current data base market environment. Moreover, Cullinane maintained IBM will be placing less importance on IMS and more on DL/1 running in a CICS environment.

Responding to this market phenomenon, earlier this year Cullinane introduced a product called IDMS/Escape, which gives DL/1 users the ability to migrate to the IDMS data base.

In the process of building the company, Cullinane, like other growing software firms, had to pay more attention to the marketing of both the product and the firm. Using a seminar approach to attract potential users, Cullinane today has 800 IDMS installations and 3,700 products installed, Goldman said.

Executive Corner

- At Western Union Telegraph Co., a susidiary of Western Union Corp., Alexander J. Chisholm has been elected vice-president of regulatory affairs, and Joel Yohalem was concurrently elected vice-president and general solicitor of that company.
- David P. Barnhill has been appointed vice-president of finance and administration and Robert B. Wright was promoted to senior vice-president and assistant to the president at Timeplex, Inc.
- H. Glen Haney, formerly vice-president of marketing for Sperry Univac, has been promoted to vice-president of strategic planning and development on the president's staff at that company.
- Jeannette Valvo has been named assistant vice-president of personnel at Data Access Systems, Inc.
- Gary. E. Meredith, Robert A. Schumacker and Gary S. Wathkins have been elected vice-presidents at Evans & Sutherland.
- Eugene F. Sovereign has been promoted to vice-president of advanced technology at Wabash Tape Corp.
- Phillip M. Lumish has been appointed vice-president of marketing at DMC Systems, Inc.
- Denis K. Vanier has been promoted to president and chief operating officer of Vanier Graphics Corp.
- Richard J. Lutz has joined Logica, Inc. as U.S. data base Manager for Prestel International.
- Erwin W. Brown has been named executive vice-president of the Electronic and Information Technologies Sector of 3M Co.
- Distributed Logic Corp. has announced the promotion of Les Alberts to vice-president of marketing and Steve Arnaudoff has joined the corporation as vice-president of international operations.

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JULY 21 NEW YORK
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AUG. 28 FRANKFURT, W. GER.

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JULY 14 DALLAS
JULY 16 TULSA
JULY 17 PHOENIX
AUG. 19 SAN FRANCISCO
AUG. 20 LOS ANGELES
AUG. 25 SEATTLE
AUG. 27 CALGARY
AUG. 28 VANCOUVER

STRUCTURED DESIGN & PROGRAMMING WKSHOP.

JULY 13-17 ATLANTA
JULY 13-17 BOSTON
JULY 20-24 LOUISVILLE, KY
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JULY 27-31 SAN FRANCISCO
AUG. 3-7 HOUSTON
AUG. 3-7 PITTSBURGH
AUG. 10-14 DES MOINES
AUG. 17-21 MONTREAL
AUG. 24-28 MILWAUKEE
AUG. 24-28 WASHINGTON

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JULY 13-17 WINNIPEG
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AUG. 24-28 ORLANDO

STRATEGIES FOR SOFTWARE DEVELOPMENT

AUG. 31-04 SAN FRANCISCO

DATABASE FOR MANAGERS

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JULY 14 BOSTON
JULY 20 SEATTLE
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AUG. 14 ST. LOUIS

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JULY 1-3 MONTERREY, MX
AUG. 3-5 NEW YORK

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AUG. 3-7 OTTAWA
AUG. 10-14 NEW YORK

AUDITING STRUCTURED ANALYSIS & DESIGN WORKSHOP

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AUG. 10-14 SAN FRANCISCO

DATABASE ADMINISTRATOR'S WORKSHOP

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AUG. 31-04 TORONTO

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JULY 14-15 CAMP HILL, PA
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Contracts and Pacts

Kierulff Electronics, Inc. has signed an agreement to distribute disk drive products manufactured by Tandon Corp.

American Microsystems, Inc. (AMI) has signed a technology transfer agreement with Wang Laboratories, Inc. of Lowell, Mass., under which AMI will provide Wang with licenses for a complete family of semicustom uncommitted logic array devices, its silicon-gate complementary metal-oxide semiconductor (Cmos) integrated circuit manufacturing process and several of its custom integrated circuit computer-aided design software packages. In return, Wang has agreed to rely upon AMI for volume production of the custom Cmos integrated circuits Wang will develop with AMI's licensed technology.

Intel Corp. and Harris Corp. have entered into a technology exchange agreement for the design of Cmos microprocessors and peripherals, which will give both companies manufacturing and marketing rights to the resulting Cmos microprocessors and peripherals.

Digital Equipment Corp.'s Microcomputer Products Group has named the Wyle Distribution Group as a distributor for its microcomputer products and associated equipment.

Zentec Corp. has been awarded a $1 million-plus contract to provide its Zephyr terminals to Cabledata.

Systems Plus has recently signed a distribution contract with Hamilton/Avnet for Avnet's Accounting Plus, a fully integrated accounting package, and FMS-80, an assembly language data base management program.

Waybern Corp. has been signed by Nippon Electric Corp. (NEC) of Japan as the distributor of the Japanese company's NEC personal computer in Southern California, Arizona, New Mexico and Nevada.

Electronic Arrays, Inc. and NEC Microcomputers, Inc., divisions of NEC Electronics U.S.A., have consolidated their sales representative organizations to provide expanded market coverage.

Computer Terminal Systems, Inc. has received $1.25 million in orders to build airline boarding pass printers and airline ticket printers from the Raytheon Data Systems Division of Raytheon Co.

Microdata Domestic Corp. has announced a purchase agreement for more than 300 of its business computer systems ordered by Automatic Data Processing, Inc.

Teletype Corp. has signed a three-year ordering agreement with Dataproducts Corp. for Dataproducts' M-200 matrix printers, to be used as an auxiliary printer on Teletype's communications systems product line.

North Atlantic Industries, Inc. has received orders for the Quantex Division's AN/USH-26(V) Tape Storage System totaling $3,133,325. The orders serve as the initial releases against a two-year requirements contract recently awarded to the manufacturer by the U.S. Naval Sea Systems Command.

Micropolis Corp. has reported an order from Dynabyte, Inc. for 8-in. Winchester drives valued at more than $2.5 million

The Tennessee Department of Health has named Computer Sciences Corp. the low bidder in a competitive procurement for a contract valued at $20 million to process Medicaid claims and is now evaluating the company's technical and business proposals for the contract, which will be awarded by Aug. 10.

International Computing Co. (ICC) has acquired rights to the RTFile relational data base management system from Interproject, Inc. ICC has agreed to be the North American representative of Hammond Software of West Germany and has also signed an independent sales agency agreement with Tymshare Corp. to market the full line of Dynasty-20 systems packaged by Tymshare.

New World Computer Co. and Nelma Electronics of Toronto have signed a $1.1 million agreement to make the firm its exclusive distributor for high-performance Mikro-Disc drives in Canada.

ADL Enterprises has signed an agreement to become authorized distributors of Hazeltine Corp.'s entire line of cost-effective terminals.

MSI Data Corp. has announced entering into a letter of authorization with IBM Corp. for preliminary development work that could lead to an order for a portable data terminal to be used internally by the IBM Customer Service Division.

Britton-Lee, Inc. has won an OEM contract from Henningson, Durham and Richardson, a systems design firm, valued at over $15 million. The agreement calls for integration of Britton-Lee's Intelligent Data Base Machines into high-speed financial transaction systems.

SCI Systems, Inc. has entered into an agreement with Monroe Systems for Business, a division of Litton Industries, Inc., to supply approximately $40 million of electronic systems and related supplies.

Dynalogic Corp. has been awarded a contract by Norpak Ltd. for its newly introduced Dynastor Model 8202 floppy diskette subsystem. It is fully compatible with Digital Equipment Corp.'s RX02 floppy diskette subsystem for the LSI-11 series of microcomputers. The Norpak contract is valued at $250,000.

Applied Communications, Inc. and Automatic Data Processing, Inc. (ADP) have signed a contract that requires Applied to provide ADP with computers and related software to support a network of automated teller machines.

Compucorp, Inc. has announced that a new customer could add $100 million to company sales over the next three to four years. The customer is IMS International, Inc., which called for the Pharmex pharmacy retail information system, which was just introduced in France.

Emulog, Inc. has awarded Data Type Terminals an exclusive contract to manufacture and market the Log 53 CRT display terminal throughout the UK.

POSITION ANNOUNCEMENTS

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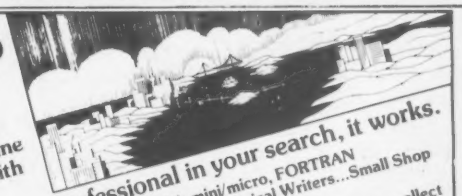

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APPLICATIONS PROGRAMMERS

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CICS Applications Programmer

Evangelical Christian Ministry seeks qualified Computer Programmers experienced in structured programming, maintenance and design. Degree desired but will give credit for appropriate experience. If you are qualified and have a desire to serve, please send resume to: **CBN Personnel, CBN Center, Virginia Beach, VA 23463.**

CBN is an equal opportunity employer.

NCR

Banking — Savings
Programmers
Analysts — Managers

From coast-to-coast; sunbelt, Midwest and Snow Country. My clients need your talents. Openings in most areas of the U.S. and at many levels. If you have recent and relevant exp. with NCR computer systems B? or VRX in Financial companies using CIF, CIRF, CLASS or your own home grown version with working knowledge of application areas such as DDA, Trust, loans investments etc. lets talk. **Be skeptical but please call Bill Ingersoll at 314-993-5959. All contacts held in strict confidence.**

Executive EDP — Personnel Service
222 S. Meramec — Suite 203
St. Louis, MO 63105
(Client Co's Assume Fees)

Computer Systems Engineer / Field Engineer

James Madison University seeks a qualified technician for installation, trouble shooting and maintenance of computer terminal, key punches, line drives, modems, couplers and installation of associated cable and other hardware. Vendors include HP, GE, Tektronix, DEC, IBM and other microcomputers and electronic equipment. Requirements include a solid background in computer equipment service and knowledge of digital electronics and trouble shooting techniques. A B.S.E.E. degree is desirable. Salary range is $20,696 to $28,548 depending upon experience. Submit resume by July 15th, 1981 to:

Personnel Office
James Madison University
Harrisonburg, VA 22807
An Equal Opportunity Employer

WEST TENNESSEE
TO $40,000
Manager of ACP Applications

Top international company requires supervisory level / project leadership individual to manage ACP applications. Must have ASSEMBLER, 5 years experience. Also COBOL, MVS, TSO, OS, DEC-20 background, a plus.

Send resume or Call TODAY: Jane Green; PERSONNEL PLACEMENT, 537-D Huffman Mill Rd., Burlington, NC 27215 (919) 584-5591 (Personnel Service).

SYSTEMS PROGRAMMING OPPORTUNITIES

EG&G Idaho, Inc., a leader in energy research and development and prime contractor for the Department of Energy's Idaho National Engineering Laboratory, has the following openings:

MINICOMPUTER PROGRAMMER/ANALYST
Develop system level, communications, and application software for real-time minicomputer data acquisition and on-line analysis systems. Requires BS or equivalent plus three years experience with emphasis on system programming of minicomputer operating systems. Experience on DEC Data General, MODCOMP, HP or various microprocessors and engineering, physics, or communications background is desirable.

SCIENTIFIC PROGRAMMER/ANALYST
Develop applications codes for engineering design and analysis studies in support of nuclear reactor safety research [thermal and hydraulic analysis, CORE design, system modeling, data processing, data base, graphics] on a dual CYBER 176 system operating under NOS/BE. Minimum requirement, BS in CS, Math, or Engineering plus three years experience with proficiency in FORTRAN. Large scale scientific codes, CDC control languages, structured system development methodology, and technical communications experience is desirable.

COMPUTER SYSTEMS ENGINEER
Design, develop, install and test computer systems in real-time data acquisition and control applications. Requires BS EE or equivalent plus 3 years experience in digital systems and implementation.

BUSINESS PROGRAMMER/ANALYST
Develop business oriented application programs on an IBM 4341 system. Requires experience in COBOL, IBM 370, and structural systems development methodology. Experience with OS/VSI, MVS, and CICS desirable. Entry level opening requires BS plus one year experience and senior level position requires BS plus 4 years experience.

SYSTEMS PROGRAMMER
Work on migration of an IBM 4341 to accommodate growth in on-line systems and data base environment. Will be involved in migration from OS/VSI to MVS. Requires BS or equivalent, plus five years experience, including three years IBM VSI or MVS Operating Systems. Experience with CICS internals or SYSGEN desirable.

DATA COMMUNICATIONS SPECIALIST
Develop, configure and manage data communications network; provide consulting services on network problems; and perform long-range data communication architecture studies. Requires BS or equivalent plus five years experience, including three years designing data communications networks for large IBM computer system. Desire knowledge of IBM OS/VSI, MVS, CICS, ACF/-VTAM, and NCP. SNA knowledge and design experience highly desirable.

Idaho Falls is located in the heart of some of the most scenic recreational areas in the country offering skiing, hunting, fishing, camping, hiking and other leisure-time activities.

Send resume and salary requirements in confidence to:

Technical Employment [A-23-MN]
EG&G Idaho, Inc.
P.O. Box 1625, Idaho Falls, ID 83415

We are an Equal Opportunity Employer M/F/H/V
U.S. Citizenship Required

The Health Services Division of McDonnell Douglas Automation Company, the nation's leader in data processing services to the health care industry, has an excellent opportunity for a...

DATA COMMUNICATIONS ANALYST

Key responsibilities will include: hardware/software evaluation, future network strategy including SNA, and proposal preparation/presentation to management.

Qualified candidates should be experienced in data communications and possess good project leadership skills. Data Communications planning experience and a college degree are a plus.

If you are interested in joining a company that offers exceptional career opportunities, please send your resume to:

Manager, Professional Recruiting
McDonnell Douglas Corporation
Department 62-118
P.O. Box 516
St. Louis, Missouri 63166

An Equal Opportunity Employer

MCAUTO

Director of Engineering

Micro-term Inc., a St. Louis based manufacturer of computer terminals, seeks an Electrical Engineer to be a member of the company's top management team. The Director of Engineering will be responsible for all engineering in the company as it relates to operations, including direct supervision of documentation, product engineering, reliability enginering, and automated test equipment. The successful candidate will have a B.S.E.E. and a minimum of five years related experience, including at least three years in a management role. Please send resume and salary history to:

Micro-term Inc.
1314 Hanley Industrial Court
St. Louis, Missouri 63144
Attn: Rick Filcoff
Equal Opportunity Employer

Financial

The Energy System Opportunities: Pacific Northwest

The Washington Public Power Supply System is a growing, major Pacific Northwest company engaged in the energy business. Our headquarters in eastern Washington, located on the banks of the Columbia, Yakima and Snake Rivers, is within a three to four hour drive of Seattle and Portland. A variety of recreational activities including snow and water skiing, camping, fishing and sailing are all within an easy drive of our office.

Senior Staff Auditor — You will implement auditing plans and programs, and perform audits of construction contracts. Requires seven years of auditing experience. A degree in business administration, finance, accounting, and/or related field is preferred.

Staff Auditor — Your responsibilities will include performing financial audit plans and programs. Requires three to five years' auditing or professional accounting experience including one to two years in construction auditing or accounting. A degree in business administration and/or accounting is preferred.

We invite you to explore the career opportunities we can offer. For more information, please call COLLECT **(509) 372-6307** or send your resume with salary history to: **Ms. Tish Jongeward, Dept. PJJ/91-25A, Washington Public Power Supply System, P.O. Box 968, Richland, WA 99352.** An affirmative action employer.

Washington Public Power Supply System

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DATA PROCESSING PROFESSIONALS

Tired of job-hopping? Here's three good reasons to settle down with Crum & Forster Corporation.

1. ENVIRONMENT. Our data processing professionals work in an atmosphere which though sophisticated and thoroughly professional, is relaxed and friendly. In fact, we think you can do your best work in such a setting.

2. OPPORTUNITY. As a DP professional you want to be where the action is. And that's here with us. The rapid expansion of our Morristown, N.J. facility has created outstanding opportunities. This is a great time to put your career into high gear—and enjoy yourself while doing it.

3. LOCATION. We're close to New York City, but suburban. There's plenty of trees, grass and fresh air. Accessible to all major highways for easy commuting.

Crum & Forster Corporation is the management services facility of Crum and Forster, a leading Fortune 50 organization in the property and casualty insurance industry. We are currently looking for the following technical expertise for our application and software areas:

- **Large Scale IBM**
- **OS/MVS**
- **VTAM**
- **COBOL**
- **CICS**
- **IMS DB**

We offer salaries fully commensurate with experience and a comprehensive benefit package, including dental plan and 100% tuition refund.

Please send your resume in complete confidence stating salary progression and requirements to: Personnel Manager, Crum & Forster Corporation, P.O. Box 2387, Morristown, New Jersey 07960. An equal opportunity employer m/f.

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QUME, located in the SAN FRANCISCO BAY AREA, is the industry leader in the development and manufacture of "Daisy Wheel" printers. We also produce terminals, disc drives and accessories. In addition, QUME is at the forefront in the development of electromechanical office equipment of the future.

SR. ANALYST PROGRAMMER

-Manufacturing-

Consider this immediate challenging opportunity to provide analysis and programming support for MRP, inventory and shop floor control system. Position requires BSCS (or equivalent) and 3-5 yrs. related experience.

QUME offers attractive salaries and benefits in one of the West's most unique, stimulating work environments. Please send resume to Denise Bridgeman, Dept. S-13, QUME CORPORATION, 2350 Qume Drive, San Jose, CA 95131. (408)942-4000. An affirmative action employer.

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The Computer Resources Group, Inc., is a long-established (9 years), highly respected (150 leading companies utilize our services), and alert organization (our data bank of computer professional needs is unmatched in the San Francisco area).

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To teach four courses per term for two year computer programming associate degree, transfer baccalaureate program and service for business and social science students. Help develop four year math/computer science program. Required languages BASIC, COBOL, FORTRAN, PASCAL; others helpful. Minimum qualifications, MS in Computer Sicence, PhD preferred. University of Pittsburgh at Bradford is a four year regional campus of the University of Pittsburgh, located in Northwestern Penn. near the Allegheny national forest. Reply by July 15 to:

Dr. Samuel Johnson
Dean of Academic Affairs
University of Pittsburgh
at Bradford
Bradford, PA 16701

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As a leader in Municipal and School Data Processing rapidly expanding their Data Processing organization to meet growing needs, we have a current career opening for a:

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Challenging opportunities are available now in our state-of-the-art facility working with a dynamic staff and our Univac 9040 Computer System with communications and on-line programming.

Consider our excellent working hours and environment, State Retirement, Blue Cross / Blue Shield-Master Medical and other fringe benefits coupled with FREE parking under 24 hour security and swift commuting adding leisure hours each work day.

Put your experience and talent to work for an organization that will appreciate your contributions.

For prompt consideration forward resume with salary history in confidence to:

Arthur M. Bromfield
Supervisor of Data Processing
Brockton Public Schools
700 Belmont Street
Brockton, Mass. 02401

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The number one carrier on the North Atlantic has immediate opportunities for three programmer/analysts. Successful candidates will have minimum three years experience designing and implementing on-line systems.

We are running an international network on two Burroughs computers. Using COBOL, FORTRAN and PASCAL you will be responsible for data base applications covering marketing statistics, cargo reservations and equipment tracking.

With full company paid benefits including continuing education, commensurate salaries and solid growth potential, why not, if you feel you are qualified and looking for personal opportunity investigate this new horizon. We are located in downtown Manhattan.

Call or send resume to Neville Williams, Manager Systems Programming, 212-908-2101 or send resume to Mr. Williams at Atlantic Container Line, 80 Pine St., New York, N.Y. 10005.

PROGRAMMING MANAGER

NCR Shop

Victory Markets, an aggressive regional supermarket company located in Norwich, NY has an opening in its Data Processing department.
The ideal candidate will have leadership ability, VRX and / or communications experience.
In addition to a competitive salary, we offer an exceptional benefit plan and relocation assistance. If you meet these qualifications, please call:

Mr. Edison Vradenburgh
Director Information Systems
Victory Markets, Inc.
54 East Main Street
Norwich, NY 13815
(607)335-4780

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(714)851-0311

EXPERIENCED SYSTEMS ANALYST / PROGRAMMER

Due to expansion and growth, large leading medical facility located in Central Texas is presently offering an opportunity to experienced, ambitious System Analyst / Programmer professionals. Excellent working conditions, living in a pollution free area amongst the friendly Texas atmosphere. Benefits are above the average including a unique medical service to immediate family. D.P. running on a 370-158 utilizing DOS / VS, CICS, DL1 and some RPG.

Send resume to:

Mildred Lewis
Scott & White Hospital
2401 S. 31st. St.
Temple, Tx. 76508

call collect: 817-774-2529 EOE

FACULTY POSITION:

Director of the Master of Science degree program in Computer and Information Science. Duties include teaching graduate and undergradute courses in an evening program and working closely with the chairman of the department in coordinating both programs and advising (academically) graduate students. Ph.D. in computer science or closely allied area required. For further information, write or telephone: **Chairman Search Committee, Troy State University in Montgomery, P.O. Drawer 4419, Montgomery, Ala. 36195. Telephone (205) 277-3249 (10 - 3 CDT).** TSU is an equal opportunity, affirmative action employer.

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PROGRAMMER ANALYST

College in the scenic Catskills seeks programmer/analyst for computer center. Bachelor's degree is required. Experience equated to a Bachelor's degree will be considered. Field experience is preferred. Salary hiring range: $17,000-$20,000. Closing date July 15, 1981. To be filled August 15, 1981. Send resume to:

Willard T. Kazas
Affirmative Action Officer
SUNY / Agricultural & Technical College
Delhi, New York 13753

An Equal Opportunity/ Affirmative Action Employer

WILLIAMS RESEARCH CORPORATION, a world leader in the research, development and manufacture of small gas turbine engines, is expanding its Data Processing Department and needs:

DATA BASE ADMINISTRATOR

Administer a corporate data base program with user inquiry and data dictionary capabilities; design, program, test and implement an integrated corporate data base system. Requires B.S. in Computer Science or Business and Minimum of 6-8 yrs. exp. in Systems and Programming including large scale data base, system planning and implementation, large integrated data base and CODASYL data base technology, and interactive/on-line programming.

Salary commensurate with exp.; excellent paid benefits. Send resume with salary history and requirements in confidence to:

WILLIAMS RESEARCH CORPORATION
Professional Personnel
P.O. Box 200
Dept. G
Walled Lake, MI 48088
Equal Opportunity Employer M/F.

Position: Lead Hardware Developer / Systems Designer

Hours: 40 per week

Salary: $31,000 per annum

Requirements: Master of Science in Computer Science; 1 year of experience in the position or 1 year experience in research in computer design; knowledge in the use of INTEL microprocessor products and knowledge of microprogramming.

Duties: Lead development of all associated hardware and firmware for a multi-microprocessor system used to test telephone switching equipment. Application of INTEL 8086 Microprocessors with standard INTEL support tools to design, develop and test microcomputers; to design, develop and test multi-processor boards to interface with other computer systems; and to design develop and test general interfaces for the PDP and multi-microprocessor modules.

Contact: James N. Daniel, Jr.
Technical Manager
SEI Information Technology
450 East Ohio Street
Chicago, Illinois 60611
Resumes required.

DATA PROCESSING MANAGER
City of Lincoln, Nebraska

This position is under the supervision of the finance director, responsible for planning and directing all data processing activities for the city divisions as well as for other governmental agencies. Hardware environment includes IBM 4341, DEC 11/70, DEC 11/780 VAX. The operational environment includes DOS/VSE, CICS/VSE. Systems software environment includes multiple CPU's/multiple program execution/multiple operational environments. Applications software environment includes COBOL, BASIC, and ADMINS. Management environment includes multiple locations/dissimilar operations 1980/81 budget with approximately $2 million dollars. Salary open. Candidate should be a graduate from a 4 year college or university with degree in related field, have appropriate experience and extensive technical expertise. Send resume to:

City County Employment Office
555 So. 10th St.
Lincoln, NB 68508

Closing date for receipt of applications is July 17th, 1981
An AAEO employer

Manager, Academic Services

The Computer Center located in the beautiful Rogue Valley, is seeking an academic computing specialist. Duties include: consulting with faculty; acquisition, development, documentation, and maintenance of academic software; hiring, training, and supervision of programmers and consultants, primarily students; participation in academic computing planning. Bachelor's degree required, master's preferred; four years programming experience in several languages; supervisory experience; knowledge of instructional applications and statistical analysis; excellent communication skills. Salary $17,000-$22,000. Mail application by July 31 to:

Dr. Tim Kelley, Computer Center
Oregon State College
Ashland, OR 97520
An Equal Opportunity Employer

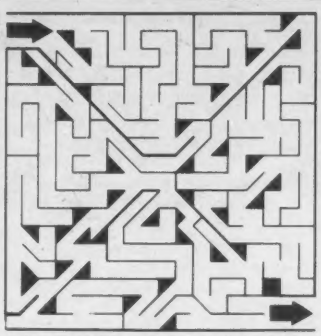
Technical Support Manager

Brenco Automation Center a wholly owned subsidiary of Brenton Banks Inc., which this year is celebrating its 100th year of service to Iowa, is seeking a qualified experienced individual to head its technical support department.

The responsibilities of this key position include the generation and maintenance of operating software components (DOS/VS/VSE, CICS, VTAM, NCP, VSAM, etc.) performance measurement and capacity planning and provide technical assistance and training to other staff members.

We offer an excellent salary and fringe benefit package and the opportunity for professional development and growth in a challenging environment. Please forward your resume or call collect:

Mr. J.E. Nevens, President
Brenco Automation Center Inc.
717 Mulberry
Des Moines, Iowa 50309
515-283-2415



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- **Applications Programming**
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PROGRAMMER ANALYSTS
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Interested candidate's should have 2 or more years experience in the following:

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- **IMS, DB/DC**
- **CICS**
- **IDMS**

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BARBARA REED
800/527-4907
214/243-3421

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Cutler-Williams Inc.
Headquarters: 2655 Villa Creek Drive, Suite 205
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You will manage our software configuration and quality assurance section. This position requires management experience plus data base techniques, software development methodology, programming standards and quality assurance experience.

Software Development Engineers

You will design, develop, implement and maintain operating systems which support existing and new products. A BS in Computer Science or equivalent technical experience, plus proficiency in FORTRAN and assembly languages are required.

Applications Software Engineers

These positions involve design and development of algorithm libraries and custom applications software. An appropriate technical degree or equivalent experience is required, as well as numerical methods, FORTRAN and assembly language programming.

If you are ready for a challenge and are technically qualified, and the beauty of the Pacific Northwest appeals to you, please call **Dan McGee (collect) at (503) 641-3151, ext. 152,** or send your resume and salary history to: **P.O. Box 23489, CW-08, Portland, Oregon 97223.** We are an equal opportunity employer M/F/H.

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Sr. Systems Programmers

Several of our San Francisco Bay Area clients have immediate openings for IMS Systems Programmers.

These positions require 6 years in Data Processing with a minimum of 3 years in IMS/MVS internals.

Responsibilities include maintenance, generation and troubleshooting of an IMS/VS DB/DC System in an MVS/SNA environment. Other duties include performance monitoring, tuning, data base recovery procedures, maintenance of on-line test environment, MTO training and applications/operations support.

Additionally, one of our client companies is in need of an innovative Systems Programmer with IBM 370 DOS/VS, POWER/VS exp. CICS/DL1 experience is a definite plus.

These positions offer excellent compensation and benefits. We are consultants to management. Please send resume including salary history, in confidence, to **CW-A3017, Computerworld, Box 880, Framingham, MA 01701.**
Employer assumes fee.

PERFORMANCE EXPERTS

APPLIED DATA RESEARCH is seeking MVS-oriented performance specialists who are knowledgeable in system tuning techniques. Candidates should have good verbal skills and enjoy conducting seminars, etc. If you are interested in a high technology environment with compensation based on achievements, reply in confidence to:

Director, Software Products Division

APPLIED DATA RESEARCH, INC.
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CRAY Research is a unique and growing company. We design, market, manufacture and support add-on supercomputers for scientific and engineering applications.

CRAY Research currently seeks people experienced with VM/370 and/or MVS operating systems to augment our customer support staff.

People knowledgable in system internals and thoroughly grounded in hardware and systems architecture plus peripheral and I/O device characteristics are required. Experience in computer-to-computer communications is desirable.

Good communication skills are necessary. Some travel may be required.

Currently available locations are:

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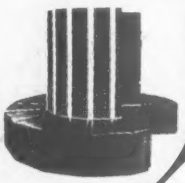
Please state your desired location and salary history with current salary requirement in a cover letter and mail same with your resume to:

CRAY RESEARCH, INC.

MAX K. MILLER
3423 Greystone, Suite 108
Austin, TX 78731
(512) 345-7034



Equal Opportunity Employer M/F

DATA PROCESSING
Software Specialist

University Hospital is seeking qualified applicants for a Software Specialist. Position requires 4 years programming experience, 1 year experience in IBM software maintenance and modification programming. The ability to effectively communicate with users is essential. Excellent fringe benefits. Reply in complete confidence to: **Dan Raphael, HISD, UOHSC, 3181 S.W. Sam Jackson Park Road, Portland, Oregon 97201 or call (503) 225-8777.**

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Software services company located near Pittsburgh seeks aggressive, self-starting individual to sell its line of software products.

With more than one hundred customer installations, our company is fast becoming recognized as one of the world's leading developers of application program generators and other, software products. The individual selected thus has a tremendous opportunity for both financial reward and increased job responsibilities.

Minimum requirements include college degree, with exposure to programming (preferably COBOL) and four years of proven sales experience. Earnings potential unlimited, but attainment of our very reasonable sales quota would result in growth annual earnings of $40,000-$50,000.

This is an opportunity for someone who likes to move fast, and control his or her own destiny. But individual selected must be professional, mature, and willing to "enter the arena to play the game".

Send resume only to: **Information and Systems Research, Inc., Airport Office Park, Building 1, 410 Rouser Rd., Coraopolis, PA 15108**

SYSTEMS ANALYST

3 years experience. 4 yrs High School. Must know COBOL and NEAT 3 languages. Design & implementation of an on-line Financial Package for a major financial institution. Responsible for interface between NCR 270 Teller Terminals and Central Computers. $19,000 per year to work 40 hrs/5 days/wk. Please send resume to: **Anscomp, Inc., 1390 Main Street, Sarasota, Florida 33577; (813) 366-2600**

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Ad closing is every Friday, 6 working days prior to issue date.

Rates: Open rate is $84.70 per column inch. Columns are 2" wide. Minimum ad size is 2 column inches (1 column wide by 2 inches deep), and costs $169.40 per insertion. Additional space is available in half-inch increments. Some sample sizes and costs are shown.

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2 cols x 5" – 847.00
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Discounts are available when you run more than 35 column inches of advertising in a year anywhere in Computerworld.
Box Numbers are available. $10 per insertion.
Ad Closing is every Friday, 6 working days prior to issue date (issues are dated Monday)

To reserve space for your ad, or if you'd like more information on Classified advertising in COMPUTERWORLD, call our office nearest you.

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San Francisco - (415) 421-7330
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William J. Mills, Manager Classified Advertising

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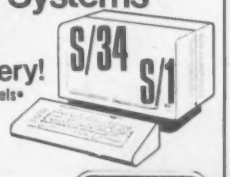

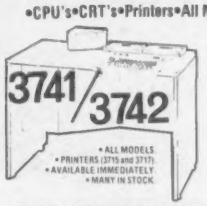

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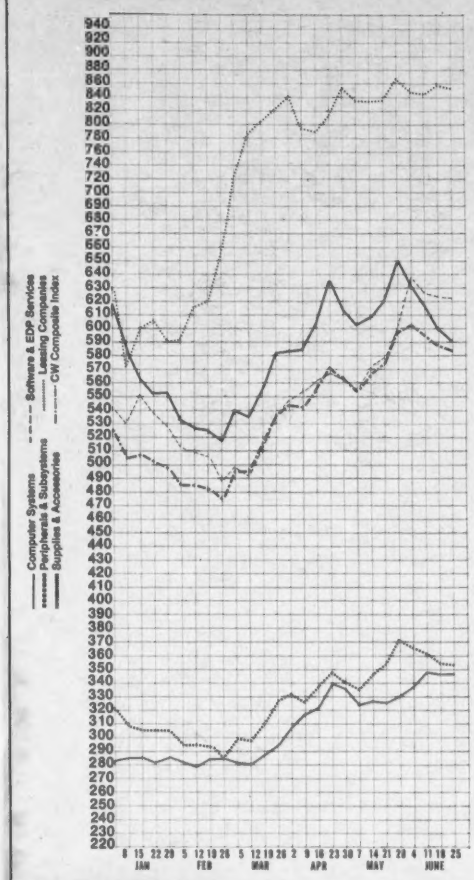

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Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, JUNE 24, 1981

All statistics compiled, computed and formatted by TRADE QUOTES, INC. Cambridge, Mass. 02139

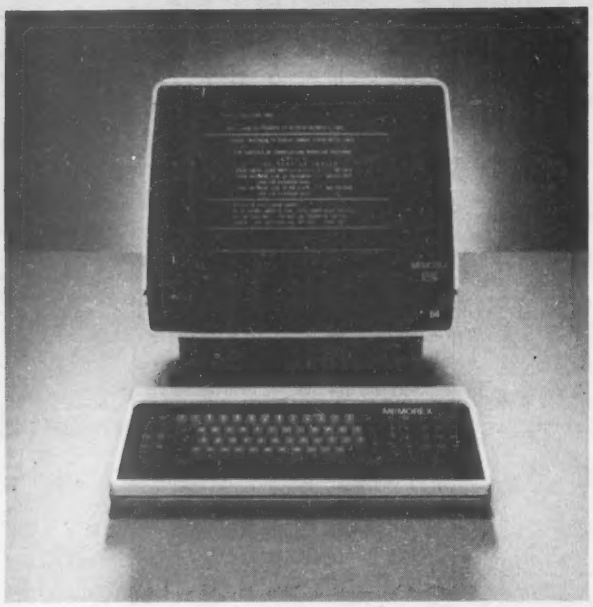
EXCH		1980-81 RANGE (1)	CLOSE JUN 24 1981	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS				
A	AMDAHL CORP	13- 45	38 1/2	- 3/8	-1.0
N	BURROUGHS CORP	40- 89	40 5/8	- 5/8	-1.5
O	COMPUTER AUTOMATION	8- 27	13	-1 3/4	-11.8
N	CONTROL DATA CORP	35- 84	72 1/4	+ 1/2	+0.8
O	CRAY RESEARCH INC	10- 48	38	- 3/8	-0.9
N	DATA GENERAL CORP	48- 87	53 1/8	- 1/2	-0.9
N	DATAPOINT CORP	22- 88	58 3/4	-2 1/8	-3.8
N	DIGITAL EQUIPMENT	82-113	101 3/8	0	0.0
A	EECO INC	8- 18	15	- 3/8	-2.4
N	ELECTRONIC ASSOC.	8- 12	7 1/2	+ 1/8	+1.8
N	FOUR-PHASE SYSTEMS	18- 48	41 5/8	- 3/8	-0.8
N	FOXBORO	31- 82	53 1/8	+ 3/4	+1.4
O	GENERAL AUTOMATION	7- 18	13 1/8	- 1/4	-1.8
O	GRI COMPUTER CORP	1- 3	1 1/4	0	0.0
N	HARRIS CORP	25- 80	45 5/8	+ 3/4	+1.6
N	HEWLETT-PACKARD CO	48-107	98 7/8	-2 1/8	-2.1
N	HONEYWELL INC	65-115	84 1/2	+1	+1.1
N	IBM	50- 79	58 1/2	+1	+1.7
O	MAGNUSON COMP SYSTS	20- 46	31 3/4	+ 3/4	+2.4
N	MANAGEMENT ASSIST	9- 25	17	+ 1/4	+1.4
O	MINI-COMPUTER SYST	1- 6	2 3/4	0	0.0
N	MODULAR COMPUTER SYS	8- 31	13 5/8	- 1/4	-1.8
N	MOHAWK DATA SCI	10- 31	21 5/8	-2 1/4	-9.4
N	NCR	52- 82	63	- 1/8	-0.1
N	PRIME COMPUTER INC	10- 48	38 1/2	-2 7/8	-6.9
N	PERKIN-ELMER	13- 35	27 1/2	-2 1/2	-8.3
N	SPERRY CORP	42- 65	48 1/2	- 1/8	-0.2
O	TANDEM COMPUTERS INC	13-104	91 3/4	+4 1/2	+5.1
N	TEXAS INSTRUMENTS	79-150	99	-1 5/8	-1.6
A	WANG LABS.	17- 80	32 7/8	-2 1/2	-7.0
	LEASING COMPANIES				
O	BOOTHE FINANCIAL CP	13- 27	25 1/4	0	0.0
N	COMDISCO INC	8- 24	23	- 3/8	-1.6
A	COMMERCE GROUP CORP	1- 2	1	0	0.0
A	COMPUTER INVSTRS GRP	1- 4	5/8	0	0.0
O	CONTINENTAL INFO SYS	2- 15	7 3/4	0	0.0
A	DCL INC	3- 8	3 5/8	0	0.0
N	DPF INC	3- 12	9 5/8	0	0.0
O	ITEL	1- 15	7/8	0	0.0
O	LEASPAC CORP	1- 2	3/8	0	0.0
A	PIONEER TEX CORP	2- 4	2 3/4	0	0.0
N	RELIANCE GROUP INC	24- 85	83 1/4	-1 1/8	-1.3
N	U.S. LEASING	12- 30	25 1/8	- 7/8	-3.3

EXCH		1980-81 RANGE (1)	CLOSE JUN 24 1981	WEEK NET CHNGE	WEEK PCT CHNGE
A	DATA ACCESS SYSTEMS	8- 23	14 3/8	- 1/4	-1.7
A	DATAPRODUCTS CORP	11- 44	28	+ 1/2	+1.7
O	DATUM INC	2- 5	2 5/8	- 1/4	-8.6
O	DECISION DATA COMPUT	2- 8	3 7/8	0	0.0
O	DELTA DATA SYSTEMS	1- 4	4 1/8	0	0.0
O	DATARAM CORP	8- 37	8 5/8	+ 1/4	+2.8
N	ELECTRONIC M & M	3- 8	5 1/8	- 1/8	-2.3
O	EVANS & SUTHERLAND	7- 38	33	0	0.0
O	FABRI-TEK	1- 8	4 3/4	- 3/8	-7.3
O	GENERAL COMPUTER SYS	1- 12	8 1/4	+ 1/2	+8.4
O	GEN'L DATA COMM IND	8- 22	13 1/4	- 7/8	-8.1
O	GENERAL TERMINAL CP	1- 4	1 3/4	+ 3/8	+27.2
N	HAZELTINE CORP	12- 33	28	0	0.0
O	INFORMATION INTL INC	8- 17	13 3/4	-1 1/4	-8.3
O	INTEL CORP	23- 90	35 1/4	- 1/4	-0.7
A	LUNDY ELECTRONICS	4- 17	14-1/2	0	0.0
O	MSI DATA CORP	3- 27	22 3/4	- 1/4	-1.0
N	MEMOREX	10- 34	11 3/4	+ 1/2	+4.4
O	NETWORK SYSTEMS CORP	14- 25	20 7/8	-1 1/2	-6.7
O	OMEX	2- 12	12	0	0.0
A	PARADYNE CORP	8- 50	42	-1 3/4	-4.0
A	PENRIL CORP	8- 17	13 3/4	+ 1/4	+1.8
O	RAMTEK CORP	10- 23	13	- 1/2	-3.7
O	RECOGNITION EQUIP	5- 21	13 1/8	+1	+8.2
O	SCAN DATA	1- 5	2	0	0.0
N	STORAGE TECHNOLOGY	12- 35	31 1/8	- 1/8	-0.3
O	SYKES DATATRONICS	5- 25	24	+4	+20.0
O	T BAR INC	14- 24	15 5/8	+ 1/8	+0.8
A	TEC INC	3- 8	5 1/8	- 1/8	-2.3
N	TEKTRONIX INC	42- 70	57 3/8	- 3/8	-0.6
N	TELEX	3- 8	7 5/8	- 1/8	-1.6
O	TESDATA SYSTEMS CP	8- 28	8 7/8	- 3/8	-3.8
A	TIMEPLEX INC	5- 22	14 3/4	-1	-6.3
O	WILTEK INC	1- 3	2 1/2	- 1/8	-4.7
	SUPPLIES & ACCESSORIES				
A	AMERICAN BUS PRODS	8- 17	16 1/2	+ 3/4	+4.7
O	BALTIMORE BUS FORMS	1- 2	1 1/4	0	0.0
N	BARRY WRIGHT	8- 23	21 3/4	- 1/4	-1.1
O	CYBERMATICS INC	1- 2	1 1/8	0	0.0
A	DUPLEX PRODUCTS INC	11- 18	15	- 1/4	-1.6
N	ENNIS BUS. FORMS	13- 21	18 7/8	0	0.0
N	3M COMPANY	48- 65	57 5/8	- 7/8	-1.4
O	MOORE CORP LTD	27- 38	37 1/2	+ 1/4	+0.6
N	NASHUA CORP	20- 35	22 1/2	- 5/8	-2.7
O	STANDARD REGISTER	22- 38	34 1/4	-1	-2.8
A	TAB PRODUCTS CO	8- 30	26 1/4	+ 3/8	+1.4
N	WALLACE BUS FORMS	12- 28	28 1/8	+ 1/8	+0.4

EXCH		1980-81 RANGE (1)	CLOSE JUN 24 1981	WEEK NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 8	5 3/4	- 1/4	-4.1
O	ADVANCED SYSTEMS INC	12- 15	12 3/4	- 1/2	-3.7
O	ANACOMP INC	8- 18	18 1/4	-1	-5.7
O	ANALYSTS INTL CORP	3- 14	7 1/4	+ 1/4	+3.5
A	APPLIED DATA RES.	8- 25	22 3/4	- 1/8	-0.5
N	AUTOMATIC DATA PROC	13- 32	28 3/4	- 3/4	-2.5
O	CDA COMPUTER ASSOC	8- 12	12 1/4	0	0.0
O	COMPUTER HORIZONS	1- 5	3	+ 1/4	+8.0
O	COMPUTER NETWORK	4- 8	5 1/4	- 1/4	-4.5
N	COMPUTER SCIENCES	11- 30	21	+ 1/8	+0.5
O	COMPUTER TASK GROUP	1- 23	21 1/2	+1	+4.8
O	COMPUTER USAGE	2- 10	3 3/4	0	0.0
O	COMSHARE	11- 21	11 3/4	-1	-7.8
O	CULLINANE DATABASE	18- 68	57 1/2	+2	+3.5
O	DATA DIMENSIONS INC	1- 8	1 3/8	0	0.0
O	DATATAB	1- 4	3 5/8	+ 1/8	+3.5
O	DBI CORP	4- 8	5 7/8	- 1/2	-7.8
O	DYATRON CORP	4- 11	10 1/4	- 3/4	-6.8
N	ELECTRONIC DATA SYST	18- 58	55 1/2	+1 1/2	+2.7
O	INFORMATICS INC	9- 33	24	-2 1/2	-9.4
O	INSYTE CORP	1- 3	2 3/4	0	0.0
O	IPS COMPUTER MARKET.	1- 4	1 1/2	0	0.0
O	KEANE ASSOCIATES	3- 8	7 1/2	0	0.0
A	LOGICON	12- 38	22 5/8	-5	-13.2
O	MNGT SCI AMER INC	17- 28	22 1/4	- 3/4	-3.2
O	MATHEMATICA INC	5- 18	17	-1	-5.5
O	MATHEMATICAL APP GRP	7- 33	27 1/2	+1 1/2	+5.7
O	NATIONAL DATA CORP	5- 27	23 5/8	- 1/4	-1.0
N	PLANNING RESEARCH	5- 13	8	+ 1/8	+1.5
O	PROGRAMMING & SYS	1- 2	1 1/2	+ 1/2	+50.0
O	RAPIDATA INC	4- 11	7 5/8	- 1/8	-1.6
O	REYNOLDS & REYNOLD	18- 24	22 3/4	-1	-4.2
O	STSC INC	8- 28	21 3/4	- 1/2	-2.2
O	SCIENTIFIC COMPUTERS	3- 17	8	- 1/2	-5.2
N	TYMSHARE INC	17- 58	44 3/8	+2 3/8	+5.6
A	URS CORP	5- 17	14 1/8	- 5/8	-4.2
N	WYLY CORP	4- 20	13 3/8	- 3/4	-5.3
	PERIPHERALS & SUBSYSTEMS				
N	AM INTERNATIONAL	11- 24	13 3/4	+ 5/8	+4.7
A	ANDERSON JACOBSON	9- 29	21 5/8	- 5/8	-2.8
O	AUTO-TROL TECHNOLOGY	18- 82	20 1/4	-1	-4.7
O	BEEHIVE INT'L	2- 18	14 1/2	+ 3/4	+5.4
A	BOLT,BERANEK & NEW	8- 25	17 3/4	-3 1/8	-14.8
N	BUNKER RAMO	17- 54	54	0	0.0
O	CAMBEX CORP	1- 9	6 7/8	- 5/8	-8.3
N	CENTRONICS DATA COMP	11- 35	12 5/8	- 5/8	-4.7
A	CETEC CORP	3- 8	7	+ 1/4	+3.7
O	COMPUTER DEVICES INC	5- 10	8 7/8	- 3/8	-5.1
O	COGNITRONICS	1- 11	8 5/8	- 1/4	-2.5
O	COMPUTER COMMUN.	2- 10	1 7/8	- 1/8	-8.8
O	COMPUTER CONSOLES	4- 37	30 1/2	- 1/2	-1.6
O	COMPUTER TRANSCEIVER	1- 8	8 1/8	+ 3/4	+10.1
N	COMPUTERVISION CORP	12- 48	42	+1 1/8	+2.7
N	CONRAC CORP	13- 27	24 1/4	- 5/8	-2.5

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

EASIER.



One of the latest innovations from the Memorex® Communications Group, the 2078 Display Station, serves as a good example of how one company works to respond to and anticipate the demands of its many marketplaces. Demands for products that perform faster, last longer, are built smaller and smarter. But most important today perhaps, for products that make life and work easier on the people using them.

To that last point, the 2078 is particularly noteworthy. And human engineering is the key, with features designed-in to make the operator's job less fatiguing and the operator more comfortable and productive. The non-glare screen reduces eye strain, while the tilt-screen design allows positioning for easy readability. We've included a line and column indicator, a status line, a switch-selectable unprotected field indicator, a choice of keyboard layouts and other features that make the 2078 a much easier display station to use.

But it is much more efficient and flexible as well. The detachable monitor can be located on a shelf or bookstand to conserve space and allow use by more than one operator. The 2078 incorporates an automatic dimming feature to preserve the quality of the display. The unit also generates less heat and uses less power. And teamed with the small, smart-looking 2076 Remote Cluster Controller, which can be conveniently located separately, the 2078 delivers more configuration flexibility.

The 2078 Display Station is, of course, just one expression of excellence from our Communications Group. But it certainly helps explain why we're so proud of our twenty years of making better products for the tough, rapidly changing marketplaces of high technology. And we look forward to the next twenty years, during which time we'll be working harder than ever to make things easier.

MEMOREX

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